Introduction

The Space Collaboration System (SCS) and the Pan Pacific Education and Communication Experiments by Satellite (PEACESAT) Network Integration Project is intended to create a means of collaboration between research and educational institutions in Japan and the Pacific Islands. As such, the project will increase the overall worth of each network and build "communities of value."

There is substantial inherent value in interconnecting existing networks. It is the most cost and time efficient means of exponentially increasing the total number of end-points available to the network users. The proliferation of users in turn increases the value of the individual networks. Metcalfe's Law[1] states "...the usefulness, or utility, of a network equals the square of the number of users (Downes & Mui, 1998)." Dr. Norman H. Okamura[2], Principal Investigator of PEACESAT is a proponent of building a critical mass of users to increase overall network effectiveness and efficacy; particularly by interconnecting and maintaining open and shared research, education and public service networks. Similarly, Metcalfe's theory suggests that once critical mass is obtained the network value increases dramatically.

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1. Metcalfe's Law was developed by Robert Metcalfe, founder of 3Com Corporation and the designer of the Ethernet protocol (Downes & Mui, 1998).
2. Dr. Norman H. Okamura, former Administrator of the Information and Communication Services Division of the State of Hawaii Department of Budget and Finance (1984-1992) returned to University of Hawaii in 1992 and is now a Faculty Specialist with the Social Science Research Institute and Director of the Telecommunications and Information Policy Group. In 1993, Okamura was invited by PEACESAT to assist in the development of the Digital PEACESAT capabilities and to build local network and program connections.

   Okamura has extensive background in developing public service telecommunication networks in Hawaii and believes that "the networks and applications should be open to all government organizations, and not just the Executive Branch of government." As a result the State of Hawaii, in 1989, unveiled the HAwaii Wide Area Integrated Information Access Network or "HAWAIIAN," that interconnected all branches of government, educational institutions, and even the county governments to a high-speed OC-3 (135 Mbps) Synchronous Optical NETwork (SONET) and two inter-island DS-3 digital microwave links. The same principles were applied to the Hawaii Interactive Television System (HITS) that was used for distance learning and training by K-12, the University of Hawaii system, and government.

   In the Pacific Islands, Okamura has contributed significantly to the establishment of public service telecommunication networks and programs. He is integral to the design and implementation of the PEACESAT digital services upgrade; America Samoa DELTA network; E-Rate networks (together with Mr. Jim Bannan, PREL) in American Samoa, Guam and the Commonwealth of the Northern Mariana Islands and the Samoa-American Samoa (SAS) network connection.

Okamura also strongly supports the concept of open networks without restrictions of cross connection given that the purpose falls within the acceptable individual network mandates. This relates to Downs and Mui's concept of "creating communities of value," whereby it is recognized that the network users provide information and resources to each other. Cross connecting networks increases user benefits. Sharing and maximizing available resources is very important in developing economies, such as the Pacific Islands region, where resources are limited, difficult to access and or not affordable.

At the 1999 Emerging Global Electronic Distance Learning Conference in Tampere, Finland the principles of interconnected, shared, and open networks were elaborated. Okamura outlined these key principles to be considered in developing regional and international distance learning networks: (1) prioritize the interconnection of existing networks, rather than build new ones, (2) encourage the development of shared networks instead of separate networks for lower education, higher education, healthcare and the like, (3) advance open networks that enable interaction between many users and organizations, and (4) build partnerships for collaboration.

An example of operationalizing the concept of 'open networks' is embedded in PEACESAT's principles for permitting users the cross connection to any educational institution, health care provider or non-profit organization. Although the headquarters of the PEACESAT Program is at the University of Hawaii, the programs and interconnections are not limited to those originating from the University of Hawaii, nor the State of Hawaii for that matter. PEACESAT, by design, facilitates the program delivery of many other institutions of higher education, health care organizations, and research organizations.

In today's global and knowledge economy "know-how replaces land and capital as the basic building blocks for growth" (Norris, 2001, p.6). Businesses are faced with the mantra 'collaborate or die,' educational institutions must also find creative means of surviving in this digital economy where students have the freedom to receive educational opportunities through the Internet or other means of distance delivery. Imaginary territorial boundaries are truly imaginary in cyberspace. Protecting one's market cannot be achieved by limiting access and maintaining closed networks. Just as there is a massive "electronic bypass of the postal system" (Downs & Mui, 1998) there will be a bypass of restricted networks at some point in time and most likely sooner than later. Therefore it is extremely critical at this juncture in the development of global learning networks that we promote the interconnection of existing networks and focus not on limiting access and infrastructure rather as educational institutions, focus on creating a competitive advantage by providing

unique and quality content. Enabling student access to lecturers and specialists worldwide and facilitating enhanced student opportunities should also be viewed as a competitive advantage rather than potential loss in revenue.

The National Institute of Multimedia Education (NIME) has many years of experience in cross connecting satellite networks in the Asia Pacific region. In 1993 NIME coordinated the satellite workshops (SAWS) using the PARTNERS Project network that included the Communication Research Laboratory, NASDA, the University of Electro Communications in Japan; King Mongkut Institute of Technology, Ladkrabang, Thailand; Institute of Technology, Bandung, Indonesia; University of Papua New Guinea; PEACESAT at the University of Hawaii, and the University of the South Pacific in Fiji (Kondo, et al., 1996). NIME was also instrumental in the next generation of this regional project called the Post-Partners Network involving Thailand, Philippines, Malaysia, Indonesia and Fiji. Experiments between SCS and the Post Partners Network and between Japan's University Hospital Network have also been conducted by NIME.

NIME and PEACESAT historically have supported a unique approach in promoting collaboration through telecommunications. The programs are focused on institutional capacity building in developing skills and applications of information technology. The collaboration with other institutes of education and organizations offers opportunities in a wide variety of subject areas. This project is viewed as an important resource for both Japan and the Pacific Islands. It is especially important for the Pacific Islands where, with the exception of Guam and Fiji there are no international ISDN services, and telecommunication capacity for Internet is limited and costly so there are no other means for international interactive video teleconferencing.

The SCS and PEACESAT Interconnection Project and those similar in nature are especially critical in developing areas where access to the Internet and advanced telecommunication services cannot be taken for granted. As members of the emerging global community we have a responsibility to contribute by providing opportunities for access to affordable telecommunication services that will support development through distance learning, telehealth and other public service programs.

Executive Summary

The integration of the Space Collaboration System (SCS) and the Pan Pacific Education and Communication Experiments by Satellite (PEACESAT) is a research and development project sponsored by the Japan National Institute of Multimedia Education (NIME).

This project expands on NIME's mission to promote collaboration among universities in Japan by encouraging regional extensions. SCS consists of 150 earth stations in 123 universities and research institutes in Japan while PEACESAT covers twenty-two Pacific Island jurisdictions; interconnecting these networks provide an opportunity for developing and sustaining regional cooperation. NIME funded a five-month research fellowship whereby Ms. Christina Higa, Director of PEACESAT and Dr. Kimio Kondo, R&D Executive Director of NIME studied both the technical and program aspects of connecting the two networks.

A comprehensive documentation of the SCS/PEACESAT Interconnection Project is provided in this research paper. It also presents a backdrop of the historical relationship between the Pacific Islands and Japan and the current status of the Pacific Islands in terms of needs and challenges. This background is provided to establish the importance and value of public service telecommunication networks such as the SCS/PEACESAT connection.

This research paper is structured in six sections: Scope of Project, Background, Phase I: Technical Interconnection, Phase II: Program Development, Phase III: Plans for Project Implementation and Evaluation and ends with a Conclusion and Recommendations.

Section I: Scope of Project

Section I identifies the overall project objectives, expected outcomes and methodology. The main objective of the SCS/PEACESAT Interconnection Project is to establish a means for Japanese and Pacific Islanders to communicate, share information, resources and work collaboratively in health and education programs. The technical objectives were achieved by studying the options, conducting technical tests, evaluating options through surveys and observations of teleconferences and preparing technical documentation. The program development objectives were achieved mainly through interviews of major stakeholders in Japan and the Pacific Islands, including presidents of colleges, professors and technical support staff (see Appendix A for a list of contacts); and conducting seminars and meetings by video teleconferece. Phase III was achieved by identifying appropriate and interested

parties and devising a pilot project and implementation plan.

Section II: Project Background

Section II begins with a historical look at the relationship between Japan and the Pacific Islands. This relationship dates back to 1919 when Micronesia was entrusted to Japan by the League of Nations (Guy, Kosuge and Hayakawa, 2000). After a nearly thirty year rule the Japanese educational structure and high standards are evident in some of the older Micronesian generations that can still understand and communicate in Japanese. Today there are strong regional alliances for cooperation in the Asia Pacific and Pacific Islands. Institutions of higher education have established agreements in support of collaborative projects in areas ranging from oceanography, cultural exchanges and nursing to sustainable island development. There are economic ties related to fisheries and agriculture. It is reported that "half of the bonito and tuna consumed by Japan is caught in the region" (PALM 2000, p.2). Japan also continues to provide tremendous regional support through technical assistance agencies such as JICA, other Japan Ministry of Foreign Affairs programs and also through non-profit organizations such as the Sasakawa Pacific Islands Nation Fund.

The Pacific Island environment is presented by reviewing the unique challenges faced in terms of geographic isolation, small populations and fragile economies. This section provides a description of the region's geographic, cultural and political identity; then discusses the governance and political boundaries explaining the waves of colonization by European countries, America and Japan.

The challenges and barriers of progressing in development and self-sufficiency are explained. The total population of the region is 8.3 million (Secretariat of the Pacific Community, 2002), however, of this, 5.4 million reside in Papua New Guinea. In contrast, Pitcairn Island's population is only 47. A population chart with data for each jurisdiction is provided in this section.

A fragile economy is reflected in the status of low Gross Domestic Product (GDP). The GDP ranges from US$447 in Kiribati, US$8000 in Palau and US$21,000 in Guam (CIA Factbook, 2002). A short discussion is presented on the limited natural resources and skilled workforce as barriers for supporting industries outside of fisheries and agriculture. Also there has been an overall decline in aid to the region in the last ten years. Reduction of overseas aid is disturbing as many Pacific Island jurisdictions are dependent on this support particularly for public services such as education and health programs.

Transportation and telecommunication are offered as potential bridges but the high cost of these services is prohibitive. In the telecommunication industry, lack of proper governance and physical infrastructure are two major factors for the high costs. It is explained that telecommunication policy is gradually developing with the introduction of national policies supporting open markets however rate reductions are equally slow. A review of the current capacity and available services is provided. International ISDN is not available in the region with the exception of Guam and Fiji, this together with the high costs justify the strong need for public service telecommunications and the integration of these networks.

There has been some progress with the implementation of the U.S. Universal Services Fund and Program in particular the development of robust networks in American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI) and Guam. The other areas in the Pacific Islands are not eligible for these programs and hence a digital divide is occurring even within the Island region.

The reality of telecommunications as a bridge is explained together with a brief look at difficult issues of development in sparsely populated, isolated and economically poor regions. Telecommunication infrastructure, whether additional fiber optic cables or new satellites may be on the horizon for the region, however the question remains whether it will be affordable, commercially feasible and sustainable. Funding is required to build and implement networks and also the need for skilled human resources to operate, maintain and manage the networks. Additionally, program and content development with special consideration for local adaptation is necessary. The Pacific Islands are in various stages of development, some jurisdictions are more advanced than others. The PEACESAT philosophy is to bridge the available, appropriate, affordable and accessible networks together to support a long and continued effort in development with the end objective of improving quality of health and education. Examples of successful uses of telecommunications for distance learning and telehealth programs in the Pacific Islands are presented depicting the true potential for telecommunications to act as a bridge for the region.

Finally, a review of the historical relationship between NIME and PEACEAT is explained. These programs have a long established relationship and independently have always supported the concept of connecting existing networks that foster international cooperation and development.

Section III: Phase 1 - Technical Interconnection

This section is organized by first introducing the SCS network and operations as

well as other networks that can be cross connected through SCS (i.e., JICA's J-Net and the World Bank's Global Development Learning Network). The PEACESAT network is described in the same fashion. PEACESAT and its parent organization, the University of Hawaii Telecommunications and Information Policy Group (TIPG) are viewed as a gateway to other networks in Hawaii and the region, including national and international connections via ISDN. A short description of the following networks is provided: State of Hawaii Telehealth Access Network (STAN); University of Hawaii Distance Learning Networks; Hawaii State Department of Education Network; American Samoa DELTA and E-Rate Networks; Samoa-American Samoa Link; the CNMI Partners in Distance Learning Network and Guam Education Network.

The SCS/PEACESAT Integration Project required an investigation of the various network connections between Japan and Hawaii primarily to seek optimal bandwidth for video over Internet connectivity. A review of these individual networks was conducted to identify possible alternative network connections for NIME. Section III outlines the various high speed networks in Japan and also Japan-to-Hawaii options. The most notable potential is the 155 Mbps Asia-Pacific Advanced Network (APAN) link between the University of Hawaii and a site to be determined in Tokyo. Implementation is scheduled for 2002. This provides significant opportunities for NIME/PEACESAT future connections.

Finally, during the course of this five-month study a comprehensive look at the various technical solutions for connecting SCS and PEACESAT was considered and reviewed for technical performance, ease of set-up and cost. The interconnection options between SCS and PEACESAT are presented in two categories: potential long-term and immediate options. The long term options included establishing a PEACESAT earth station at NIME; connecting through the former Post-Partners Network either from Fiji or the Philippines; and JCSAT Japan-Hawaii possibilities. Two short-term options were trialed and tested, one using ISDN and the other IP. The technical performance was nearly equal, except that the IP reliability was not consistent. However, IP was selected as the first option for connection mainly because with this option metered charges were eliminated. It was found that in distance learning, cost-effectiveness and affordability are two key factors that contribute to stimulating increased network usage.

Section IV: Phase 2 - Program Development

This section provides summaries of Pacific Island institutes of higher education accessible via PEACESAT; included are short descriptions of the institute's background, telecommunication capacity, existing distance learning programs and

any expressed or initial interest in working with institutes and organizations in Japan and potential utilization of the SCS/PEACESAT connection. The educational institutes included are: University of Guam; Palau Community College; American Samoa Community College; National University of Samoa; College of the Marshall Islands; College of Micronesia; Northern Marianas College; University of the South Pacific (not accessible through SCS/PEACESAT, but a major player in higher education in the Pacific Islands) and University of the Ryukyus.

A summary of planned projects and potential program areas, needs and interests as identified through interviews and meetings is included in this section. The general program areas include: facilitation and coordination of institutional relationships; language courses and teacher training (Japanese and English); intercultural exchange programs and K-12 programs.

Section V: Phase 3 - Project Planning and Implementation

A pilot project is planned between the Republic of the Marshall Islands (RMI), Japan and Hawaii. The learning objectives and scope of project are presented in Section V. The main course objective will be to compare preconceived notions of cultural differences in business management, intercultural communication and delivery of education. These topics were selected as they fit within the scope of the individual courses: in Hawaii, the UH Kapiolani Community College course is the *Introduction to Communication* (involving intercultural, business and telecommunication topics); in RMI, the College of the Marshall Islands course is on *Business Management* (including intercultural management styles); and in Japan, the University of Miyazaki course is on *Teacher Training*. The University of Miyazaki also includes English language practice as one of its student learning objectives.

Students and professors will be provided a survey regarding the technical aspects of using the SCS/PEACESAT connection and program/content, student/professor satisfaction, etc. The results of this project will be written up and submitted to various distance learning and educational journals for publication consideration.

Conclusion and Recommendations

The SCS and PEACESAT Interconnection Project was successful in not only meeting the overall project objectives but also in raising the awareness of existing relationships between Japan and the Pacific Islands as well as potential program areas for collaboration and resource sharing. The technical components of the project are complete with the selection of IP as the first method of cross connecting the networks and ISDN as a back-up. The study provides information on numerous

future options if there is a need for increased bandwidth capacity and for including Asia Pacific sites. The program development will be on-going. There are a few projects that are already scheduled (University of the Ryukyus Seminars; National University of Samoa Cultural Exchange, Aoya High School Language and Culture Program) and others that are in the planning stage (Japanese Language Teacher Training, Telehealth and other Distance Learning Programs). The implementation of the pilot project as outlined in Phase III will provide more information on the use of SCS and PEACESAT for international exchanges between Japan, Hawaii and the Pacific Islands.

Following is a summary of recommendations provided:

- Implement the Phase III pilot project using SCS and PEACESAT for evaluation and input for improved international exchanges between Japan, Hawaii and the Pacific Islands.
- Promote SCS/PEACESAT usage for Japan/Pacific Island collaborative activities, distance learning and course exchanges.
- Operationalize the interconnection between SCS and PEACESAT:
  - Establish a Memorandum of Agreement between NIME and the University of Hawaii in support of continued collaboration and cooperation.
  - Establish Operational Procedures: There is a need to create standard operating procedures between the two Network Operation Centers to cover scheduling reservations, guidelines for acceptable use and technical procedures.
  - Establish a management framework that includes a user fee structure.
- Consider the development of NIME's NOC as a bridge to facilitate the cross connection of various types of networks and protocols. There are many factors to deliberate. Researchers do not want to be tasked to manage operations and therefore the NOC must be equipped with increased operations staff and equipment that will enable the transcoding of various network protocols. The NIME NOC will require a gateway and gatekeeper for the H.320 and H.323 transcoding and may consider a video teleconference multipoint conferencing unit, however if SCS is being reviewed for potential network upgrade from analog to digital services, it is recommend to incorporate the NOC upgrades at the same time to ensure compatibility of the MCU and modified SCS network scheme.
- Promote NIME as an agency of collaboration that is reflective of its network capabilities. Encourage other Japanese funded and operated regional networks to combine resources by interconnecting and sharing content, for example:
  - J-NET (JICA)
  - APAN (Asia Pacific Advanced Network)

- K-12 Networks
- University Hospital Networks

NIME's mission to promote and assist institutes of higher education in Japan and its growing commitment in supporting collaborative projects internationally positions NIME as a critical organization for Japan as it faces issues and challenges of globalization. Japan also has many individual networks and many that extend internationally as well. NIME already has a role in managing the operations of SCS and providing coordination of 123 universities and research institutes, it is a natural evolution for NIME to assume the responsibility (or at least be equipped for the capability) of being a gateway in Japan for these various networks.

The SCS/PEACESAT Interconnection Project established a means for a Japan-Pacific Island connection and reviewed potential program areas and existing institutional relationships. The project also increased awareness of the unique challenges faced by neighboring Pacific Island entities highlighting many commonalities in terms of island economies, sustainability, environment and cultural preservation, particularly with the Okinawan island chain. Unlike past 'experiments'of network integration, the SCS/PEACESAT connection is expected to be operational and on-going; therefore it is appropriate for the establishment of a Memorandum of Agreement between the two institutes.

A SCS/PEACESAT network demonstration was held at the Pacific Island Digital Opportunity (PIDO) conference at the University of Hawaii and sponsored by the Sasakawa Pacific Islands Nation Fund in August 2002. The video conference included Japan (Okinawa and Chiba), Hawaii (Honolulu), the Pacific Islands (American Samoa, Palau and Majuro). Presentations were given to the PIDO conference from the University of the Ryukyus and the Office of the Governor of American Samoa. Conference participants included the Minister of Education of Samoa; Chief of Staff to the President of the Republic of Palau; officials from the Pacific Island Forum Secretariat; Pacific Resources for Education and Learning; East-West Center; Japan Consulate; Japan National Committee for Pacific Economic Cooperation; University of the South Pacific; Nihon University; University of Electro-Communications, and representatives from utilities such as the power and telecommunication authorities among others.

The SCS/PEACESAT Interconnection Project was published in the Institute of Electronics, Information and Communication Engineers (IEICE) Journal (ET2002-32~43) and presented at the IEICE conference on networking at the University of Miyazaki and a second conference on educational technology at the University of Hiroshima.

Acknowledgements

This NIME research fellowship has provided me the opportunity to reflect and develop clear professional and personal objectives. I treasure the experience to have worked with NIME researchers, other colleagues in Japan and the Pacific Islands. I look forward to many more years of continued program development and relationships between Japan and the Islands.

I acknowledge Dr. Takashi Sakamoto, Director General of NIME for supporting the visiting researcher program and taking interest in PEACESAT and the Pacific Islands. I am especially grateful for Dr. Kimio Kondo, Executive Director of Research and Development for promoting and practicing collaboration in distance learning networks. Dr. Kondo despite his heavy responsibilities and numerous meetings spent a significant amount of time personally setting up equipment and participating in our technical tests. I appreciate his time and energy. I'm also thankful to the SCS technical and operations team. Everyone's patience in having to communicate with me in English (or by playing charades) is very much appreciated.

I am thankful for the other NIME researchers and staff including Dr. Miwa, Dr. Osawa, Dr. Yuki and many others that spent personal time to assist with this project. Ms. Katagiri, Ms. Sato, Ms. Hirai and Ms. Furuya were especially helpful in making my stay very comfortable and enjoyable.

There are many long-time friends of PEACESAT in Japan, too many to name here, however I would like to acknowledge Dr. Takashi Iida, President, Communication Research Laboratory for his on-going support and enthusiasm that initiated the partnership between PEACESAT and so many partnering agencies in Japan. Ms. Rieko Hayakawa of the Sasakawa Pacific Islands Nation Fund has contributed significantly to the continued relationship between Japan and the Pacific Islands especially in regard to telecommunication development.

Also I must recognize Dr. Norman H. Okamura, PEACESAT, Principal Investigator, for giving me this opportunity to work with NIME and for supporting my personal development. I acknowledge the PEACESAT Headquarters Staff for the extra effort during my absence.

I appreciate my husband Scott Culbertson's steadfast support, encouragement and patience especially during our time apart and living in separate countries.

Finally to all those in the Pacific Islands and Japan that participated in the video demonstrations, tests and interviews, I value your time and contributions to this project.

Mahalo,
Christina Higa

Section I: Scope of Project

The SCS and PEACESAT satellite networks provide service to areas with differing environments and needs that vary from developed and technologically advanced users in Japan to developing economies in the Pacific Islands. The SCS provides T-1 circuits to educational and research institutes throughout Japan and PEACESAT provides narrowband public service telecommunication services to developing areas in the Pacific Islands.

Interconnecting these existing networks will expand the potential network applications and assist in fostering international collaboration in distance learning, education and economic development. It also serves as a model of interconnecting high-end and narrow band technologies that with the progression of globalization is increasingly necessary internationally and between varying levels of economic and technological development.

Project Objectives and Expected Outcomes

1. Develop a technical and operational procedure for interconnecting the Space Collaboration System, PEACESAT and other public service networks;

2. Identify potential collaborative program areas between educational institutions of the Space Collaboration System and PEACESAT;

3. Plan and implement a pilot course or project between a Pacific Island and Japanese educational institution;

4. Measure the effectiveness of the intercultural distance learning pilot course to provide data and input for future international distance learning courses offered through these network connections; and

5. Establish a Memorandum of Agreement between the National Institute of Multimedia Education and the University of Hawaii as a framework for on-going collaboration.

Methodology

The project covered a period of five months (April 3, 2002 to July 2, 2002 and September 5, 2002 to November 4, 2002). There are three major project phases: (I) technical network interconnection; (II) program development and (III) project implementation and evaluation. Phases I and II were completed during the five

month project period. Phase III will be executed in Spring 2003. It is also expected that on-going programs and evaluation of the use of the SCS/PEACESAT cross connection will be continued, therefore a Memorandum of Understanding between NIME and the University of Hawaii is being processed.

Interviews and meetings were conducted in person or by video teleconference and correspondence through electronic mail. A list of contacts can be found in Appendix A.

Phase I: Technical Interconnection

The objectives of Phase I were to determine all potential technical options for network interconnectivity, determine the feasibility of the options, evaluate technical performance, ease of operation and cost effectiveness. The methods of meeting these objectives include:

❖ Review Technical Options

Determine Methods for Interconnecting SCS and PEACESAT

- Investigate Telecommunication Connections between Hawaii and Japan
- Review High Speed Networks within Japan

❖ Conduct Technical Tests

ISDN Interconnection between NIME and TIPG

ISDN Interconnection between SCS (through NIME) to PEACESAT (through TIPG)

IP Interconnection between NIME and TIPG

IP Interconnection between SCS (through NIME) to PEACESAT (through TIPG)

❖ Evaluate Technical Options

Conduct Survey of Users & Observe Connections for:

- Ease of Operations
- Performance and Reliability of Network Connection
- Voice and Video Quality
- Echo and Delay
- Clarity of Image and Voice
- System Comparison between H.320 and H.323
- Cost Evaluation
- Investigate Potential Equipment Upgrades

- ❖ Technical Documentation
  Configuration
  Operational Procedures

Phase II: Program Development

Phase II identifies potential network applications between Japan, Hawaii and the Pacific Islands. Information on program development was collected through:

- ❖ Review of existing relationships between Japan and the Pacific Islands;
- ❖ Interview major stakeholders;
- ❖ Review existing distance learning networks and programs in Japan, Hawaii and the Pacific Islands;
- ❖ Conduct pilot seminars and meetings using the network for immediate feedback through evaluation surveys (Appendix B contains a sample of the VTC Feed Back Form); and
- ❖ Conduct network demonstrations and discussions on applications

Phase III: Project Implementation and Evaluation

The future extension of this research is underway in the planning of Phase III. These plans are in progress:

- ❖ Identify a pilot site in Japan, Hawaii and Pacific Islands;
- ❖ Plan and finalize scope of project; and
- ❖ Design a project plan and evaluation scheme

Section II: Background

This section provides information that gives emphasis to the significance of the SCS/PEACESAT Integration Project. First a review of the relationship between Japan and the Pacific Islands is presented, followed by a description of the Pacific Island environment and special challenges and finally a look at the historical relationship between NIME and PEACESAT.

Relationship between Japan and the Pacific Islands

History

The relationship between Japan and the Pacific Islands dates back to the early twentieth century. Specifically in 1919, Micronesia was entrusted to Japan by the League of Nations (Guy, Kosuge and Hayawaka, 2000). The region of Micronesia consisted of the Marshall Islands, Carolinian Islands and the Northern Mariana Islands. In 1922, Japan established the Pacific Island Agency in Palau to administer this region (PALM, 2000). There was an extensive migration of Japanese to the islands resulting in a population consisting of a majority of Japanese nationals. The indigenous population was approximately 40,000 in comparison to 100,000 Japanese (Federated States of Micronesia Government, 2002). Nishio and Quackenbush (1998) state in a Report on Japanese Language Education in the Pacific Islands Region that during the nearly thirty year rule of Micronesia, the Japanese government established an educational system designed to meet standards identical the Japanese national standards. The institution of the Japanese educational system is apparent even today in the older Micronesian generation that is able to understand and communicate in Japanese.

Economic Relationship between Japan and the Pacific Islands

The Pacific Islands Leaders' Meeting (PALM) web site (2000) describes the important economic ties between Japan and the Pacific Islands mainly in forestry, fisheries and agriculture. The PALM web site describes these specific economic links (PALM 2000, p.2):

- "...half of the bonito and tuna consumed by Japan is caught in the region";
- According to 1998 data the Pacific Island/Japan import and export figures are "around US$1.6 billion" (US$960 million - imports to Japan and US$660 million - exports from Japan); and
- "Major exports to Japan include lumber from Papua New Guinea, the Solomon Islands, and Fiji; tuna from the Micronesian region (the Federated States of Micronesia, the Republic of the Marshall Islands, Palau and Kiribati), and squash from Tonga."

Financial Aid to the Pacific Islands

The Government of Japan is the world's leading contributor of Official Development Assistance (ODA). In 2000, Japan provided US $13.5 billion to developing countries to support areas of education, health, trade and investment and environment (Japan Ministry of Foreign Affairs, 2002). In comparison, in 2000 ODA from other countries such as the United States was $9.5 billion, Germany $5 billion, United Kingdom $4.4 billion, France $4.2 billion, Canada $1.7 and Italy $1.3 billion (The ITU Association of Japan [ITU Japan], 2002). Japan's total ODA contribution is equal to one third of total ODA contributions of all industrial countries (U.S. Department of Commerce, 2002). Development of infrastructure as a foundation in supporting these humanitarian efforts is a major contribution of Japan to the Pacific Islands region.

Japan provides mainly bilateral support to the region through "grants-in-aid and technical cooperation (PALM 2002, p.1)." Many grants are administered through the Japan Ministry of Foreign Affairs and the aid through the Japan International Cooperation Agency (JICA).

The overall ODA assistance for telecommunication represents only 0.4% of Japan's total ODA funds in FY2000 (ITU Japan, 2000). However, Japan together with Australia and New Zealand funded the University of the South Pacific's USPNet. The University of the South Pacific also contributed to the site preparation and video teleconferencing equipment costs for many sites (Chandra & Taafaki, 2002). In total the USPNet capital costs was US$7 million with annual operating cost of US$450,000 (Chandra & Taafaki, 2002).

The Sasakawa Pacific Islands Nation Fund (SPINF) also contributes significantly to the Pacific Islands since 1988. SPINF supports activities that promote international collaboration, mutual understanding between Japan and the Pacific Islands, human resource development and distance learning and telecommunication policy development. SPINF funds approximately 3-6 billion yen (US$200,000 to $500,000) in total grants annually.

Pacific Island Environment

Geographic, Cultural and Political Identity

The Pacific Ocean covers one-third of the earth's surface scattered within this vast area are approximately 7,500 islands of which about 500 are inhabited (South Pacific Commission, 2002). Herein lies 22 distinct economies with diverse cultures, languages and varying levels of political classifications such as countries, territories, commonwealths, etc. The region is segmented into the three cultural jurisdictions:

Micronesia, Melanesia and Polynesia. Tremendous cultural diversity in this region is evident in that it holds nearly a quarter of the world's languages however the region includes less than a tenth of the world's population (University of Hawaii Center for Pacific Islands Study, 2002).

Governance and Political Boundaries

The entire region has been through waves of colonization governed by European countries, America and Japan.

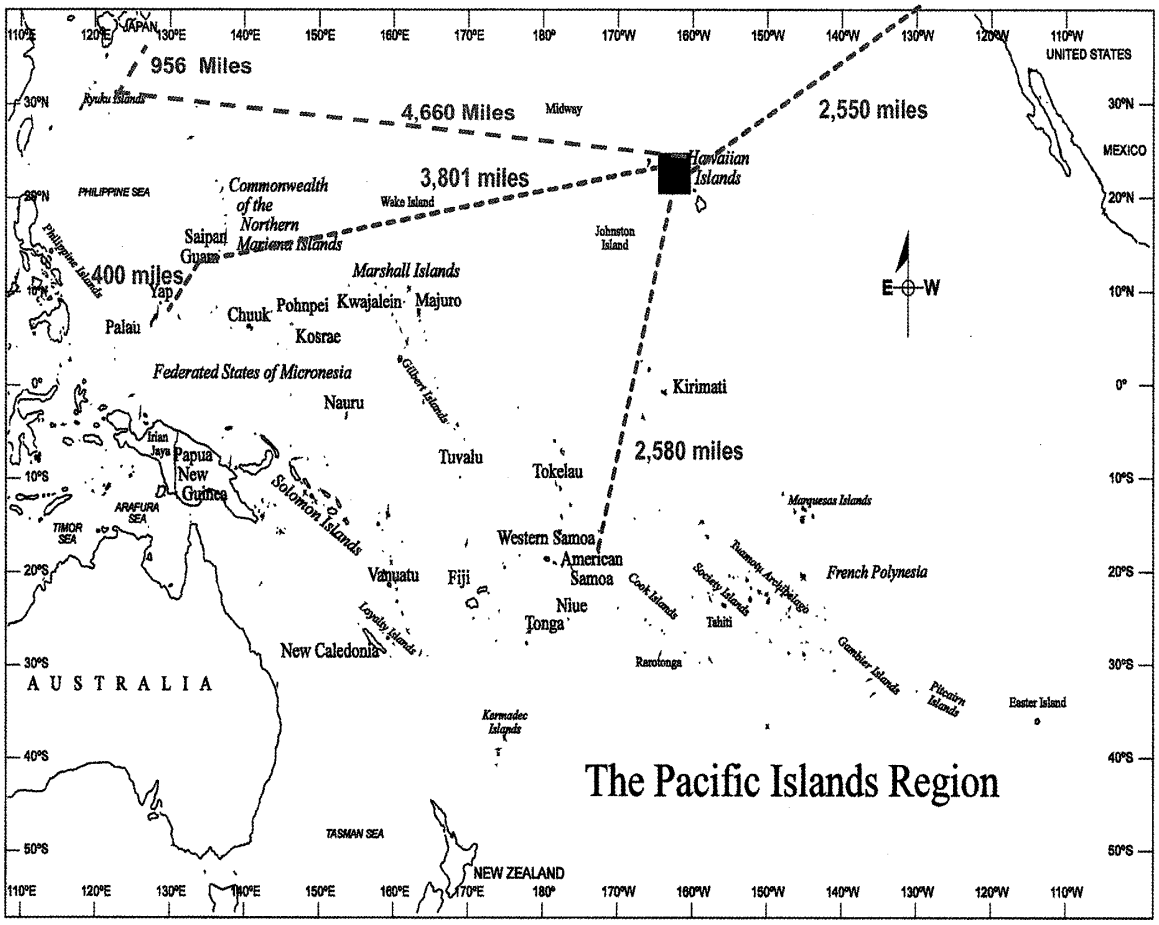
Pre World War I, European rule was dominant with Britain claiming Australia, New Zealand, Solomon Islands, Papua and Fiji; France (New Caledonia, Marquesas and Tahiti); Spain (Easter Island); Germany (New Guiena, Buka, Bougainville, New Britain, New Ireland, Micronesia and Samoa) (Guy, Kosuge and Hayawaka, 2000).

Post World War I Japan governed Micronesia; Britain (New Guinea); French (New Ireland); and New Zealand (Samoa).

After World War II Micronesia was administered by the United States under a mandate from the United Nations and are now recognized as "U.S. freely associated states" including the Republic of Palau, Republic of the Marshall Islands and the Federated States of Micronesia. It is important to note that these jurisdictions are represented in the United Nations as independent political entities. Guam and American Samoa are U.S. territories and the Commonwealth of the Northern Mariana Islands is a U.S. commonwealth[3]. Others have ties to Australia (Papua New Guinea, Nauru), New Zealand (Cook Islands, Niue, Tokelau, Samoa) and France (New Caledonia, Wallis and Futuna and part of Vanuatu).

3. The United States has several dependencies that are not classified as states, but rather "territories", "commonwealths", "possessions" or "freely associated states." The classification of "territory" can be viewed as one step prior to Statehood. "Commonwealth" is just one classification behind territory. (MacMeekin, 2000; 2001).

Figure 1: Pacific Island Region - Distances
Map by Thomas M. Okamura



Many jurisdictions are moving towards independence. The Secretariat of the Pacific Community (2002) reports that 15 of 22 Pacific Island economies are constitutionally independent.

Challenges and Barriers

The Pacific Islands region faces many barriers to development and self-sufficiency. Geographic isolation due to large distances between islands together with fragile economies and small populations are common challenges for all Pacific Islands. Other issues of development include the preservation of cultural identity in adaptation of administrative processes and service programs. Preservation of the environment and limited natural resources are difficult challenges for small island development.

Small Population

A 2002 population estimate of the Pacific Island region by the Secretariat of the Pacific Community (2002) is 8.3 million. The population varies from only 47 in Pitcairn to 5.4 million in Papua New Guinea. See Table 1

Poor Economies

The Gross Domestic Product (GDP) also varies substantially throughout the region. According to a 2001 Price Waterhouse Economic Study, the range of GDP in forum island countries is from US$447 (Kiribati 1993) to US$8000 (Palau 1996). The

Table 1: Oceania Population 2002 (partial)
Source: Secretariat of the Pacific Community <http: www.spc.org>

Country		at last census	Mid-year Population estimate 2002	Land area (km^2)	Population density (people/km^2)
American Samoa	2000	57,291	60,000	200	300
Cook Islands	2001	18,027 *	17,900	237	76
Fed. State of Micronesia	2000	107,008	110,700	701	158
Fiji	1996	775,077	823,300	18,333	45
Guam	2000	154,805	159,900	541	296
Kiribati	2000	84,494	86,900	811	107
Marshall Islands	1999	50,840	53,200	181	294
Nauru	1992	9,919	11,900	21	567
Niue	1997	2,088	1,882	259	7
North. Mariana Islands	2000	69,221	73,300	471	156
Nouvelle-Caledonie	1996	196,836	229,300	18,576	12
Palau	2000	19,129	19,900	488	41
Papua New Guinea	2000	5,190,786	5,471,200	462,243	12
Pitcairn	1999	47	47	39	1
Polynesie Francaise	1996	219 521	239 800	3 521	68
Samoa	2001	174,140 *	175 000	2 935	60
Solomon Islands	1999	409 042	439 400	28 370	15
Tokelau	2001	1,537 *	1 538	12	128
Tonga	1996	97 784	101 100	649	156
Tuvalu	1991	9 043	10 100	26	388
Vanuatu	1999	186 678	199 600	12 190	16
Wallis et Futuna	1996	14 166	14 700	255	58
* Preliminary census results					

range is very similar for non-forum countries with the exception of Guam that has a relatively high GDP of approximately US$21,000 (2000) in comparison to other Pacific Islands (CIA Factbook, 2002). The Gross National Product (GNP) in 2002 for Japan and the United States as reported by the ITU Association of Japan, INC. (2002) is US$32,030 and US$31,910 respectively. The world average GDP is US$5,205 (Brandjes, 2002).

Agriculture and fisheries are the largest industries supporting Pacific Island economies. As already mentioned about half of Japan's bonito and tuna are caught in the Federated States of Micronesia, the Republic of Palau and Kiribati. Again, other Pacific Island industries that impact Japan are lumbar from Papua New Guinea, Solomon Islands and Fiji and squash from Tonga. The limited natural resource and skilled workforce are major challenges for the islands in establishing self-sustaining and developed economies.

Overall aid to the Pacific region is reported have declined over the last ten years partially because the region is not strategically as important as it was before the end of the Cold War (Guy, Kosuge and Hayawaka, 2000). The United States is currently undergoing renegotiations of the Compact Agreements with the Federated States of Micronesia and the Marshall Islands and many fear significant aid reduction. The reduction of overseas aid is disturbing as many of the Pacific Island jurisdictions are dependent on this support particularly for public services such and education and health programs.

Education and Health Care

A major goal of the Pacific Islands is to improve the quality of life through access to better on-island education and health care. The isolation, lack of resources and skilled personnel create challenges in providing adequate services (Best, 2002). Many schools are faced with inadequate computers and connectivity and worse others do not even have electricity. Hospital facilities are also limited; some are not fully equipped with basic medication and due to severe budget constraints do not permit long distance telephone calls. Often there are no specialists on island and without contact with colleagues, physicians are professionally isolated.

Potential Bridges

Transportation and telecommunication offer the potential to overcome some of these challenges yet it is in fact this geographic isolation that contributes to the extremely high cost of these services. Considering the low income levels, transportation and telecommunication services described in the following sections are often cost prohibitive to the average citizen in the Pacific Island.

Transportation

Air transportation in Micronesia is a monopoly operated by Continental Micronesia. The costs are high and flight schedules limited. All connecting flights are through Guam. Although there are daily flights between Guam and Hawaii, most of the flights from other Micronesian islands to Guam are only twice a week. The cost for travel from Hawaii to Guam (3800 Miles) is approximately US$980-1500. A flight between Guam and Yap is about US$550-630 and about US$1500 to the Marshall Islands. Comparatively a round trip air ticket between Hawaii and California (2550 miles) costs about US$300 to $500 and Hawaii to Washington D.C. (~5000 miles) is US$750-950.

In the South Pacific travel costs are equally expensive. There are two flights per week between Hawaii and American Samoa and the cost is about US$700-800. Travel between Port Moresby, Papua New Guinea to Sydney New South Whales, Australia is about US$850 - $1000 and Nadi, Fiji to Auckland, New Zealand approximately US$672-$735.

Telecommunications

Telecommunication governance and lack of physical infrastructure are two major factors for the high cost of telecommunications in the islands.

Governance

The dominant form of telecommunication governance in the Pacific Island region is government owned "corporatized monopolies" that control all forms of telecommunication services. The exceptions are the U.S. territories of American Samoa and Guam, and the Commonwealth of the Northern Mariana Islands, where telecommunications is competitive even though the telecommunications carrier may be a corporatized entity. A select few private companies operate in other parts of the Pacific Islands however these carriers are permitted to provide only a limited range of services. Competitive cost and quality of service are key issues regardless of the form of governance. The strong hold and control of government monopolies traverse related sectors of the telecommunication industry often resulting in high-priced services. As summarized by Dr. Norman H. Okamura at the Pacific Island Digital Opportunities meeting (August 2002):

> Government monopolies control local telephone, Internet, mobile and long distance services. Additionally, and just as important, the carriers have controlled off-island telecommunications so that even if there were a competitive Internet service provider, the cost can be very high because of the margins assigned to off-island links by the monopoly off-island carrier.

In the past, telecommunication carriers often argue that the Pacific Islands are "too small" or "too poor" for competition. Increasingly however it is acknowledged that only a few countries are in fact too small for competition in the region as there are examples of successful liberalization in these small market areas. Okamura states that, "if policymakers examined the cases of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam, they would be dispelled of the myth that the Pacific island countries are too small for competition." For example:

* American Samoa, with a population of 57,000 has two competitive carriers for long distance, Internet services, and mobile communications. Both carriers have separate off-island links and thus, the dominant carrier cannot dictate the price of the off-island service to the competitive carrier.

* In the Commonwealth of the Northern Mariana Islands, with a population of 69,000, there are four long distance carriers, four Internet Service Providers, and two mobile telephone providers.

* Guam, with a population of 140,000 has five long distance companies, four Internet service providers, and two mobile telephone providers.

Off-island, international, telecommunication is completely liberalized in these areas. Okamura suggests lower telephone rates are a result of this policy infrastructure. Long distance calls from Guam and CNMI to anywhere in the continental US is approximately sixteen cents per minute and high-speed Internet access is very affordable.

With respect to the "too poor" argument, Okamura believes that "most Pacific island countries could attract investors to assist in the development of telecommunication infrastructure, but, unfortunately, the current policies are impediments. Further regulatory change will permit markets to determine whether or not there are opportunities and test the argument."

There are clear reasons for the difficulty in developing telecommunication policies in the region, the lack of national ICT policies and regulatory bodies are contributing factors. While governance of telecommunication affects social and economic development, it has been difficult for governments to develop policies and regulatory regimes and to consciously determine tariffs and costs assigned to residential, business, and government sectors. Okamura notes that historically, "the subject has not surfaced as a transparent policy issue and the telecommunication carriers have dominated the policy process. Policymakers are at a disadvantage because of the technical nature of ICT, the need to understand the business costs and

issues that underlie tariffs, and the lack of separation between the policy/regulatory body from the service provisioning sector. The carriers, which have more financial resources, can always claim that a "technology" is not affordable or that a policy will so severely impact the telecommunication carrier that service levels will drop or prices severely increase. The claims are difficult to examine for policymakers and the carriers are much better organized as an interest group."

Recently, telecommunication governance issues have risen to the forefront of international organizations. Related key principles outlined in the G8 Okinawan Charter on Global Information Society are promoting and fostering "appropriate policy and regulatory environments to stimulate competition," "open markets for the provision of information technology and telecommunications products and services."

The Asia Development Bank (ADB) in adopting the G8 Charter principles developed three strategic approaches in "developing ICT applications and promoting their extensive use (ADB, 2001)," these strategies are to: create an enabling environment, build human resources and develop ICT applications and information content. In relation to telecommunication governance, the statement emphasizes creating an enabling environment "by fostering (i) the development of innovative sector policies, (ii) the strengthening of public institutions; and (iii) the development of ICT facilities and related infrastructure, and networks (ADB, 2001)".

The importance of an enabling policy and regulatory framework is a concern for the Pacific Island Forum Secretariat (PIFS). Addressing the Pacific Islands "Digital Divide" chaired by former Ambassador Yoshifumi Matsuda in Hong Kong (December 2001), Mr. Noel Levi, Secretary General, PIFS states, "the Pacific countries recognize the potential of ICT to accelerate development in many sectors, and are ready to move to implementation." He discusses the constraints of "prohibitive service fees, inadequate human resources for both policy and technology, poor quality infrastructure" among many others faced by the Pacific Islands region. Levi clearly articulates the need for implementation of a policy framework that stimulates growth of the ICT industry in the Pacific Islands, he states:

> What the island economies need is assistance in implementation, such as developing policy frameworks that allow growth of the sector instead of constraining it. This would mean creating national development strategies that recognize the convergence between telephony, broadcasting, and the Internet and allow each of them to provide new services. It also means creating independent regulators to oversee national policies. Most importantly, it means liberalizing, wherever possible, to allow competition in service provision, as the existing monopolies have stifled development through their

> exorbitantly high charges and slow implementation of new technologies...This, in turn, may mean that hard decisions have to be made where expectations of long-run monopoly profits by some investors have to be disappointed in the broader interest.

The Pacific Island Forum Secretariat and other regional organizations, such as the Secretariat of the Pacific Community, the South Pacific Applied Geoscience Commission, the Sasakawa Pacific Islands Nation Fund, the United Nations Development Program and others have supported the development of national ICT plans and strategies; thus increasing the capacity of local governments to take important first steps towards an improved environment for ICT.

Recognizing and addressing the issues of policy, regulation, and transparency by international and regional organizations are critical in the progression of telecommunication development in the region.

Capacity and Services

Fiber Optics

It is not economically feasible for telecommunication companies to invest in long haul fiber optic cables to tiny islands that are separated by such large distances and do not offer a healthy consumer base. There are only fiber optic connections from Guam to Hawaii, Guam to the Philippines and between Guam and CNMI. Southern Cross connects Australia, New Zealand, Fiji, Hawaii and California. The fiber optic connection between Japan and U.S. is growing in performance and capacity at 640Gbps with self healing services (ITU Association of Japan, 2002). The most recent announcement of new fiber connectivity in the islands is between the Republic of Palau, Yap, Federated States of Micronesia and Guam. Third quarter of 2004 is the projected completion date (Deleno, 2002). Fiber optic infrastructure is sparse in the Pacific Islands however the telecommunication companies and governments are in constant dialog for being included in any transpacific fiber runs.

Communication Satellites

Satellite telecommunication infrastructure remains appropriate for the islands as it is distance insensitive. Commercial satellites in the region traditionally include Intelsat and PanAmSat; other service providers such as Alcatel and New Sky are entering the market. There are other satellites in the region but with spot beams only to developed areas that have higher market values.

ISDN

Integrated Digital Service Network (ISDN) is only available off island in Guam and Fiji and on-island in the Republic of Palau. Providing ISDN services is very

expensive and requires telephone switch upgrades and maintenance. The market demand for ISDN services is too low to support the deployment and switch upgrades in the rest of the region.

Cost

The U.S. Territories of Guam, American Samoa and the Commonwealth of the Northern Mariana Islands fall under the North American Numbering Plan. In Guam and CNMI the long distance rates nationally range between US$.05 to $.30 per minute depending on the time and day. American Samoa will soon follow with similar rates. Residential Internet rates average between US$5.00 to $30.00 per month per household. For the other locations in the islands, telecommunication costs are much higher despite the developments in telecommunications over the years.

ISDN service rates in Guam are pricey at $234 per hour for a 384Kbps connection to the U.S. Mainland. According to Mr. Max Pallison of the Guam Hospital Authority, this is a reduction from $900 per hour.

According to Mr. Stephen Keevil, Manager, Finance and Information Technology Services, Pacific Island Forum Secretariat, the FIGNET group[4] pays US$4,160 ($8,321 Fiji Dollar) per month, US$49,920 per annum ($99,852 Fiji Dollar) for a 128 Kbps link. This capacity is shared among all members of the FIGNET group. The Pacific Island Forum (PIF) Secretariat contributes approximately US$7,500 per year for use of about one eighth of 128 Kbps link. Mr. Kevil reports that the system works fairly well for emails without large attachments. He estimates that the 128 Kbps provides PIF with an average throughput of 10 Kbps. This is a vast improvement from the 0.7 Kbps throughput prior to the recent increase in bandwidth.

These are some examples of recent telecom costs in non U.S. Territories and Commonwealths:

Long Distance Telephone Rates

- Republic of Palau to Honolulu = US$1.50 per minute
- Federated States of Micronesia to Honolulu = US$1.00-2.00 per minute
- Fiji to Honolulu = US$1.31 per minute
- Honolulu to New York or Washington DC or Florida = US$.08

4. FIGNET is a consortium of organizations is Fiji consisting of Medicine, Mineral Resources Department, Fiji Institute of Technology, Delegation of the European Union, Fiji Trade & Investment Board, French Embassy, Pacific Islands Forum Secretariat, Secretariat of the Pacific Community

T-1 Circuit Annual Rates

- American Samoa to Hawaii US$760,000 Year
- CNMI, Guam to Hawaii US$200,00 Year

Internet Rates

- Republic of the Marshall Islands
  US$10 registration (no free usage), US$3.60 per hour
- Federated States of Micronesia
  US$19.95 monthly, 3 free hours, US$1.95 per hour
- Republic of Palau
  US$19.95 per month (includes 5-hours of service) (Best, 2002)
- Fiji Internet Group
  US$4,160 per month for 128 Kbps

Impact of U.S. Universal Services Fund and Program

The Telecommunications Act of 1996, established a mechanism for a U.S. Universal Services Fund and Program to help equalize the access to advanced telecommunication services particularly for rural health care facilities, schools and libraries. The Schools and Libraries program is referred to as E-Rate, this program has significantly increased the telecommunication services for schools and libraries in the U.S. Territories and Commonwealths including American Samoa, Guam and the Commonwealth of the Northern Mariana Islands. The E-Rate Program funding cap is $2.5 billion annually. The program provides discounts to the schools based on the percentage of students qualifying for low income status. The schools in the islands almost all qualify for the highest discount of 90%. This has enabled the implementation of various education networks as described in the section on 'Pacific Partners Networks'. The advanced telecommunication services, for the first time, are affordable to these schools and libraries. The other islands in the region do not qualify for U.S. Universal Services Funds and do not have a compatible support program.

Reality of Telecommunication as a Bridge

Although there are pockets of improvement in most part the telecommunication infrastructure and related policies and regulations remain limited in the Pacific Islands. These are issues of development that are difficult in sparsely populated, isolated and economically poor regions. Some of the issues include funding to physically build and maintain the infrastructure, skilled human resources to operate and manage the networks and enabling regulatory structures to support affordable services. The development or adaptation of locally appropriate content and programs is another challenge requiring funding and other human resources skill sets.

Telecommunication services that have been provided in a public service and affordable means have proven to increase access to programs in health and education and significantly assist in reducing the challenges of isolation. A few examples include telehealth programs such as the renal dialysis consultations between American Samoa and Hawaii that resulted in keeping a clinic operational in American Samoa by meeting a need for the renal cases to be reviewed by a nephrologist (even if in Hawaii and by video teleconference); the completion of numerous distance learning courses by students in the Pacific Islands in subject areas such as nursing, teacher training, educational technology, public health and sign-language to name a few; and the participation of physicians and medical officers in continuing medical education programs.

The need for affordable and accessible telecommunication services in the Pacific Islands is very clear. There is a strong desire to access the Internet, electronic mail and video teleconferencing services for participation in distance learning and telehealth programs as both content providers and recipients. The need for local, regional and international communication capabilities is also critical for the islands in the larger scheme of globalization.

Telecommunication infrastructure, whether additional fiber optic cables or new satellites may be on the horizon for the region, however the question remains whether it will be affordable, commercially feasible and sustainable. Funding and money is needed and just as importantly the structures to support ICT related activities and programs are required. The Pacific Islands are in various stages of development, some jurisdictions are more advanced than others. The PEACESAT philosophy is to bridge the available, appropriate, affordable and accessible networks together to support a long and continued effort in development with the end objective of improving quality of health and education.

Historical Relationship between NIME and PEACESAT

The National Institute of Multimedia Education's mission is to provide support for "collaborative use of information technology by national universities" (NIME, 2001). NIME was established in 1978. Since 1971, the PEACESAT program of the University of Hawaii has conducted satellite experiments initially "...to demonstrate the benefits of currently available telecommunication technology when applied specifically to the needs of sparsely populated, less industrialized areas" (PEACESAT, 1980) and continues to provide public service satellite telecommunication for education and health applications.

There has been a long developing relationship between the PEACESAT Program

of the University of Hawaii and NIME together with the other PARTNERS Project members. Dr. Takashi Iida, President, Communication Research Laboratory (CRL) provided a historical account of this relationship during his keynote address to the 2002 Forum on the Results of the Post Partners Experiment, Tokyo, Japan. As early as 1976 Dr. Iida was first introduced to the PEACESAT founders Drs. Bystrom, Yuen and Nose of the University of Hawaii. In 1980 during the development of the Engineering Test Satellite (ETS), Dr. Iida proposed a satellite broadcasting system for the Asia Pacific. Around the same time Japan's Pacific Island Telecommunication Group was active in seeking a replacement for PEACESAT's ATS-1 satellite.

The PARTNERS Project developed from a venture between CRL and PEACESAT. In 1990 CRL and PEACESAT conducted an interactive video teleconference test via Japan's ETS-V satellite. The experiment studied the utilization of small earth stations for mobile communications using 64Kbps circuits. The late U.S. Senator S. Matsunaga declared 1992 the International Space Year marking the 35th year after the launch of Sputnik. Many projects worldwide were selected to demonstrate space development. The CRL/PEACESAT project entitled "PEACESAT expansion/ Pan-Pacific Information Network" using the ETS-V satellite was selected as an ISY activity. It is out of this initial project that the Japan Ministry of Post and Telecommunications together with NASDA and other partnering agencies established the PARTNERS Project (Kondo, et al., 1993).

NIME took the lead in developing the applications of the PARTNERS Project in establishing the satellite workshop seminars and other cross cultural network experiments.

Early Cross Cultural Network Experiments by NIME and PEACESAT

As early as 1994, NIME and PEACESAT conducted a first time ever intercultural video teleconference between school children in Hyogo, Japan and Honolulu, Hawaii using the Post-Partners network connection. The 6th graders gave various cultural presentations and engaged in an interactive discussion. A second video conference similar to this was also held in 1994 between University students of the Nanzan University, Nagoya, Japan and the University of Hawaii. This connection was established through ISDN and the ETS-V satellite.

Section III: Phase 1 - Technical Interconnection

Space Collaboration System (SCS)

The SCS Network was established under the direction of Dr. Kimio Kondo in 1996 as the first interuniversity network in Japan. The SCS network is managed and operated by NIME and consists of 150 earth stations located in 123 institutes in Japan (see Table 2 for list of SCS participating universities and institutes). SCS provides video teleconferencing to Japan covering the northernmost Hokkaido to the southernmost Okinawa. The SCS network has grown significantly since its initiation in 1996. The network usage is logged at approximately 3300 hours per year. Applications range from inter-university distance learning, course exchange, conferences regarding specific research topics (i.e., parallel computing, virtual university) to general administrative meetings (Kondo & Higa, 2002).

Technical Outline

SCS utilizes the commercial JCSAT-3 satellite (14/12 GHz) in a mesh configuration. This topology was designed specifically to eliminate the need for highly trained and expensive licensed operators at each of the nodes. Normally, under the Japan radio wave law, a licensed operator is required at each earth station where the system transmission is not controlled by a hub and antenna gain is greater than 50 dB. The VSAT SCS systems operate using a 2.4 meter antenna, with a 50 dB gain and 35 Watt Solid State Power Amplifier. The SCS network hub is located at NIME in Chiba and operates using a 4.5 meter antenna with three 275 Watt High Power Amplifiers (Kondo, 2002).

Interactive video teleconferencing services are provided using T-1 (1.544 Mbps). SCS has access to three 1.544 Mbps circuits on the satellite transponder. Generally two are used for interactive video teleconferences. The third T-1 is available on an as needed basis. There are separate control channels (64/32 Kbps) that are used to communicate between the Hub and user earth stations. All sites have the same capability of acting as the chairman or recipient of the video teleconferences. This function is highlighted as a key component of the SCS system design.

Currently SCS does not provide access to data or Internet services, however NIME has conducted studies on data transmission for the potential of transmitting teaching material overnight when the network is not being used. These tests were conducted using the third T-1 circuit and is still under review for quality of service and performance.

Figure 2: Space Collaboration System
Courtesy of NIME

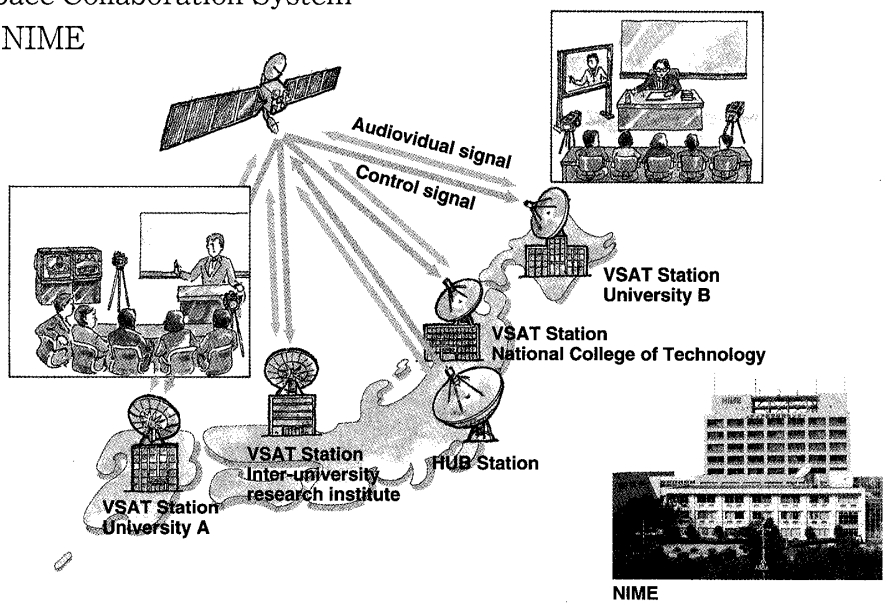


Table 2: List of SCS Participant Universities and Institutes

University	National Colleges of Technology Institutes
〔National Universities〕 Hokkaido University(3) Hokkaido University of Education(2) Muroran Institute of Technology Otaru University of Commerce Obihiro University of Agriculture and Veterinary Medicine Kitami Institute of Technology Hirosaki University Iwate University Tohoku University(3) Miyagi University of Education Akita University Yamagata University(2) Fukushima University Ibaraki University University of Library and Information Science University of Tsukuba(2) Utsunomiya University(2) Gunma University Saitama University Chiba University(2) The University of Tokyo(3) Tokyo Medical and Dental University(2) Tokyo Gakugei University Tokyo University of Agriculture and Technology Tokyo Institute of Technology Tokyo University of Mercantile Marine Ochanomizu University The University of Electro-Communications Hitotsubashi University Yokohama National University Niigata University Nagaoka University of Technology Joetsu University of Education Toyama University Kanazawa University Fukui University Yamanashi University Shinshu University Gifu University Shizuoka University Nagoya University(3) Aichi University of Education Nagoya Institute of Technology Toyohashi University of Technology Mie University Shiga University Kyoto University(4) Kyoto University of Education Osaka University(3) Osaka University of Foreign Studies Osaka Kyoiku University Hyogo University of Teacher Education Kobe University(2) Kobe University of Mercantile Marine Nara University of Education Wakayama University Tottori University Shimane University Okayama University Hiroshima University(2) Yamaguchi University(2) The University of Tokushima Nara Women's University Naruto University of Education Kagawa University Ehime University Kochi University Fukuoka University of Education Kyushu University Kyushu Institute of Design Kyushu Institute of Technology Saga University Nagasaki University Kumamoto University Oita University Miyazaki University Kagoshima University University of the Ryukyus Japan Advanced Institute of Science and Technology Nara Institute of Science and Technology The Graduate University for Advanced Studies 〔Private Universities〕 Hokkaido Information University Hokkaido Tokai University Tohoku Fukushi University Keio University Shibaura Institute of Technology Tokai University Toyo University Hosei University(2) Waseda University Nagoya University of Commerce and Business Administration Doshisha University Kansai University Kyushu Tokai University 〔National Junior Colleges〕 Tsukuba College of Technology 95 universities (81 national,13 private,1 national junior college)	Miyagi National College of Technology Sendai National College of Technology Gunma National College of Technology Kisarazu National College of Technology Gifu National College of Technology Numazu College of Technology Toyota National College of Technology Suzuka National College of Technology Tsuyama National College of Technology Kure National College of Technology Niihama National College of Technology Kurume National College of Technology Kitakyushu National College of Technology Kumamoto National College of Technology 14 national colleges of technology **Inter-university Research Institutes** National Institute of Polar Research National Institute of Genetics The Institute of Statistical Mathematics International Research Center for Japanese Studies National Astronomical Observatory National Institute for Fusion Science Okazaki National Research Institutes High Energy Accelerator Research Organization National Museum of Ethnology National Museum of Japanese History National Institute of Multimedia Education(3) 11 inter-university research institutes **Others** The Japan Foudation Association of Internatinal Education. Japan The University of the Air(2)

Transportable SCS Earthstation

NIME has developed a transportable SCS earthstation equipped with a VSAT antenna capable of transmitting and receiving JCSAT 3 signals for participation in SCS. The transportable earthstation is often used on location and/or for universities that are not permanently equipped with an SCS facility.

Table 3: Summary of Project Relevant Equipment at NIME

Video Codec(s)	⑿ H.261 NEC TC5000EX - DOI E08986 (1) Polycom FX (2) Polycom ViaVideo
Switch/Bridge	Analog Matrix Switch Imagenics VSW 6464 Imagincs SW- 4000
ISDN	(2) Unbonded 64Kbps circuits, through a PBX
Internet	(1) T-1 to SINET (Not currently interconnected to SCS)
Router (s)	Cisco
Firewall	There are two Firewalls.

Network Operations Center

The SCS Hub provides network scheduling and reservations, overall operations and network monitoring. NIME contracts NEC for these services. There are two system operators that cover operations from 9:00 am to 5:30 pm, Mondays through Fridays. Off hour scheduling is available with advance notice.

The SCS scheduler is available by Internet to users for viewing and submitting satellite requests. In establishing a conference information is sent, via satellite, to all the participating SCS sites at the start of each conference. Conference information such as channel assignment, designated chairperson, agenda and participant list are provided in this transmission (Kondo & Higa, 2002).

Each SCS facility has two touch-panel monitors that are used for line control in accessing the various location in the conference and the other for AV control to switch AV functions such as cameras, monitors, etc.

Network Section
The Network Section of the Operations Department consists of seven full time personnel. This section handles the routine operations of managing the SCS network such as reservations; administrative functions regarding the satellite use and maintenance issues (contracts monitoring, payments, etc.).

Research and Development
Dr. Kimio Kondo is the Executive Director of the Research and Development Department. R&D continues to act as the primary technical support and advisor of the SCS engineering functions.

Other Networks in Japan

J-NET

The J-Net Program is managed and operated by the Japan International Cooperation Agency (JICA). The main objective of the J-Net Program is to improve the overall technical cooperation through interactive video teleconferencing, course delivery and effective follow-up and project maintenance. Please refer to Appendix C for more information on J-NET.

The J-Net network will consist of Japan and the Association of Southeast Asia Nations (ASEAN) Countries[5]. As of October 2002, the network is comprised of the following locations:

1. Tokyo, Japan – JICA Training Center
2. Okinawa, Japan – JICA Training Center
3. Manila, Philippines – University of the Philippines
4. Kuala Lumpur, Malaysia – Government Employee Training Center
5. Jakarta, Indonesia – Export Training Center

There are current plans for the implementation of three additional locations at the start of 2003, they are:

1. Vientiane, Laos
2. Hanoi, Vietnam
3. Bangkok, Thailand

J-Net will provide interactive video teleconferencing in point-to-point or multipoint mode. The JICA Training Center in Tokyo is equipped with an Accord MGC 50 bridge. J-Net, as many other networks, struggle with quality of service issues

5. Consisting of : Indonesia, Malaysia, Singapore, the Philippines, Thailand, Brunei, Cambodia, Laos, Myanmar, and Vietnam

in using H.323 IP video teleconferencing, however all the recipient countries of J-Net are using H.323 video. A video teleconference demonstration between Tokyo and the Philippines using IP video teleconferencing showed good video quality for training and distance learning applications.

JICA's policy on J-Net usage is in development however at the time of this writing, the use of J-Net is free of charge to all JICA projects and JICA is open to permitting the use of J-Net to any non-JICA agency however the fee for this service is yet to be determined.

Interconnection to the Space Collaboration System could be established to J-Net with either ISDN or through H.323 IP video teleconferencing. JICA could deliver programming to the Pacific Partners Networks through PEACESAT. However it was also recommended to JICA that a Pacific Island location be considered as a JICA Center and J-Net node. Fiji or Samoa were discussed as potential site locations. This is currently not on JICA's agenda for deployment.

Global Development Learning Network (GDLN)

The Global Development Learning Network (GDLN) is an information telecommunication initiative of the World Bank. GDLN interconnects 37 centers worldwide. The major purpose of the World Bank is to focus on developmental programs working in conjunction with non-profit and non-government organizations in assisting leaders with issues of governance, health, population and trade, "to build local capacity, share learning and knowledge, and develop a global community dedicated to fighting poverty" (Global Development Learning Network [GDLN], 2002).

GDLN is open to collaboration and have a partnership with JICA through the J-Net Project. The programs will cooperate in the deployment of additional centers and potentially cross connect networks to maximize coverage. The agencies are also attempting collaboration in the area of content development; as previously mentioned GDLN and J-Net working together on the delivery of a course on consultant evaluation.

The idea of sharing content and programs with leaders in the Pacific Islands was broached. The World Bank is open to sharing programs especially if the network connection (through SCS/PEACESAT, etc.) will not increase the World Bank's overall operational cost. Currently there are no GDLN centers in the Pacific Islands, however the National University of Australia in Canberra is a World Bank Center that manages the Pacific Island region. Further investigation in the possibilities of involving the Pacific Islands in receiving World Bank programming is necessary.

The World Bank is also under pressure to increase the number of GDLN centers from 37 to 100 by 2003. It was mentioned that the cross connection of GDLN to other existing networks such as SCS and PEACESAT would increase the number of locations significantly and that a GDLN center should be considered in the Pacific Islands or Hawaii where network interconnections are feasible and practical. For expanded notes on GDLN please see Appendix D, that includes a summary of a meeting with Mr. Tsutomu Shibata, Senior Advisor and World Bank Institute Representative for Japan.

PEACESAT

The PEACESAT network is managed and operated by the Telecommunications and Information Policy Group (TIPG) of the University of Hawaii. Dr. Norman H. Okamura is the Director of TIPG. Administratively TIPG falls under the Social Science Research Institute of the College of Social Sciences.

The PEACESAT network was developed more than thirty years ago to serve Pacific Island jurisdictions. The network is based on the use of decommissioned satellites. It was initiated with the U.S. National Aeronautic Space Agency's (NASA's) Applications Test Satellite (ATS-1) satellite. The program is now using the GOES-7 satellite of the U.S. National Oceanic Atmospheric Administration (NOAA).

The PEACESAT Program supports public service telecommunications in distance learning, telehealth, telemedicine, economic development and other non-profit applications. Appendix E contains a list of selected PEACEAST Programs.

The network consists of 53 earth stations in 22 economies primarily located in educational, health, emergency management and government institutions (see Table 4 for list of active PEACESAT locations). There are approximately a dozen active earth stations today. PEACESAT is currently in a transition period from analog to digital services that enable interactive video teleconferencing, voice conferencing and access to the Internet.

Technical Outline

Of the 53 earth stations, 15 are digitally equipped and capable of 32 to 128 Kbps circuits. There are varying levels of earth stations: standard (3-3.5m antenna, 50W HPA); hub (6-7.2m antenna, 75-100W HPA); network hub at the University of Hawaii (10m antenna, 200W SSPA) and a tracking telemetry and control station from a NASA facility in Kauai, Hawaii at the Kokee Park Geophysical Observatory (7.5m antenna, 120W HPA) (Kondo & Higa, 2002).

Table 4: Active PEACESAT Earth Stations

PEACESAT

Video Teleconferencing to:
- American Samoa
- Commonwealth of the Northern Mariana Islands
- Federated States of Micronesia (Chuuk, Kosrae, Pohnpei, Yap)
- Guam
- Republic of the Marshall Islands
- Republic of Palau

Voice Teleconferencing to:
- All of above and
- Fiji
- Papua New Guinea

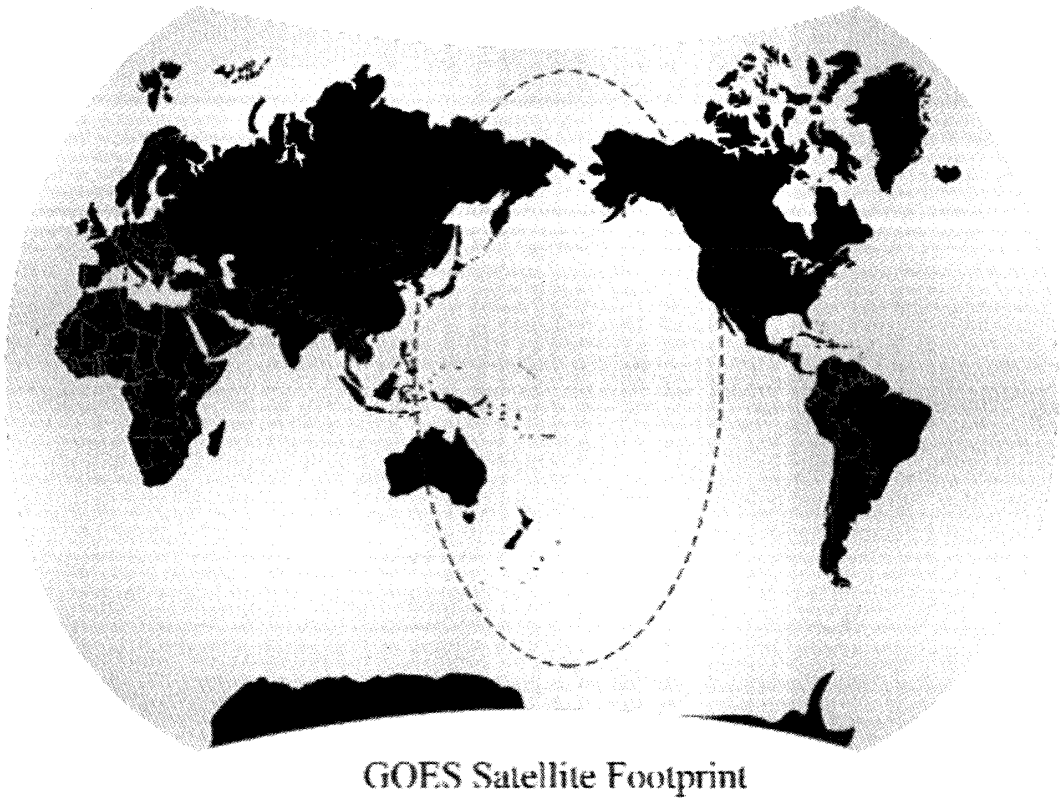


Figure 3: PEACESAT Coverage Area

The network operates in both a star and mesh configuration. The mesh configuration is used for analog services such as voice teleconferencing and point-to-point digital video conferencing where any one site can directly connect to another in the network. The star configuration is used for Internet services because the TIPG

operations center provides links to commercial ISP providers. This configuration is also used for multipoint video teleconferencing as the TIPG NOC operates several multipoint video teleconferencing bridges.

Network Operations Center

The TIPG NOC is viewed as gateway between various networks in Hawaii and the Pacific Islands. The NOC supports multiple types of network connections (satellite, fiber, HDSL), protocols (ISDN, ATM, Frame Relay) and video standards (H.320, H.323). It provides interconnection to PEACESAT, STAN, University of Hawaii Interactive Television System (HITS), Pacific Partners Network (including T-1 connections to the Guam Department of Education, Commonwealth of the Northern Mariana Islands Public School System, American Samoa Department of Education and a 384Kbps link to the American Samoa Distance Education Learning and Telehealth Applications (DELTA) network (that is interconnected to the Samoa-American Samoa Link (SAS)).

Technically it is equipped with bridging technology including a PictureTel 570 Montage Multipoint Conferencing Unit, Accord MGC 100 Bridge (capable of H.323/H.320 transcoding), Radvision Gateway and Radvision Gatekeeper. The bridge is able to join various network connections in one conference including: H.320 (using ISDN, ATM) and H.332 (IP) (Kondo & Higa, 2002).

The TIPG NOC subscribes to eighteen BRI and two PRI ISDN circuits. Fifteen BRI's are supported through multiple Ascend Multiband Plus Inverse Multiplexers. At video conferencing speeds of 384Kbps, TIPG can support five ISDN sites allowing connectivity to any site worldwide that supports bonded ISDN video calls. The Ascend unit only supports bonded connections; it does not support 2 x 64 connections. The remaining three BRI lines are connected to an Adtran ISU512 connected a RadVision L2W-323 Gateway. This connection enables ISDN to IP communication and vice versa.

The two PRIs are connected directly to the Accord MGC-100 MCU. At video conferencing speeds of 384Kbps, TIPG can support six ISDN sites. The Accord MCU supports both Bonded and 2 x 64 connections.

Operationally, the TIPG NOC is staffed by a Systems and Operations Manager, a Systems Operator, three computer specialists, two network engineers and several part-time operators. The NOC manages network schedules, service requests, conference set-up, user orientations, network monitoring and maintenance. The hours of operations are, in Hawaii Standard Time, Monday - Friday 8:00 AM to 8:00 PM, Saturday 9:00 AM to 1:00 PM and Sunday 12:00 noon to 5:00 PM and available

during the off hours with advance notice.

Connectivity to Other Networks

The TIPG NOC is specifically designed to facilitate the interconnection to various networks. As mentioned previously, Dr. Norman H. Okamura, Director, TIPG has designed the network plan to incorporate this capability. One connection into the TIPG/PEACESAT network will enable the cross connection to many other networks (See Figure 4). Following are brief summaries of the networks available through this cross connection.

Integrated Services Digital Network (ISDN)

To emphasize again, ISDN is not available in the Pacific Islands with the exception of Guam and Fiji therefore a connection to TIPG through PEACESAT or other Pacific Partner Networks is very important for the Pacific Islands to gain access to locations available nationally and internationally by ISDN. The cost factor is determined by the long distance ISDN rates between the remote location and Hawaii.

Hawaii Networks

State of Hawaii Telehealth Access Network (STAN)

The State of Hawaii Telehealth Access Network (STAN) is a public-private telehealth and telemedicine network for health care providers, educational institutions, and government agencies in all the major Hawaiian Islands. Video teleconferencing, Internet and voice over IP are services provided over STAN. The network applications include clinical, financial, and management information services; telehealth applications such as continuing medical education and training; and community and patient information services.

STAN consists of more than forty direct connections to health care facilities throughout the State of Hawaii including all twelve Hawaii Health Systems Corporation (HHSC)[6] hospitals, the Community Based Outpatient Clinics of the Medical and Regional Office Center of the Veterans Administration in Honolulu (VAMROC-Honolulu), and the Shriners Hospital for Children. The University of Hawaii at Hilo, Maui Community College and several UH Manoa departments are also connected. The network backbone consists of commercial T-1, some T-1 over copper with CSUs/DSUs and HDSL, spread spectrum microwave, and fiber optics (Okamura

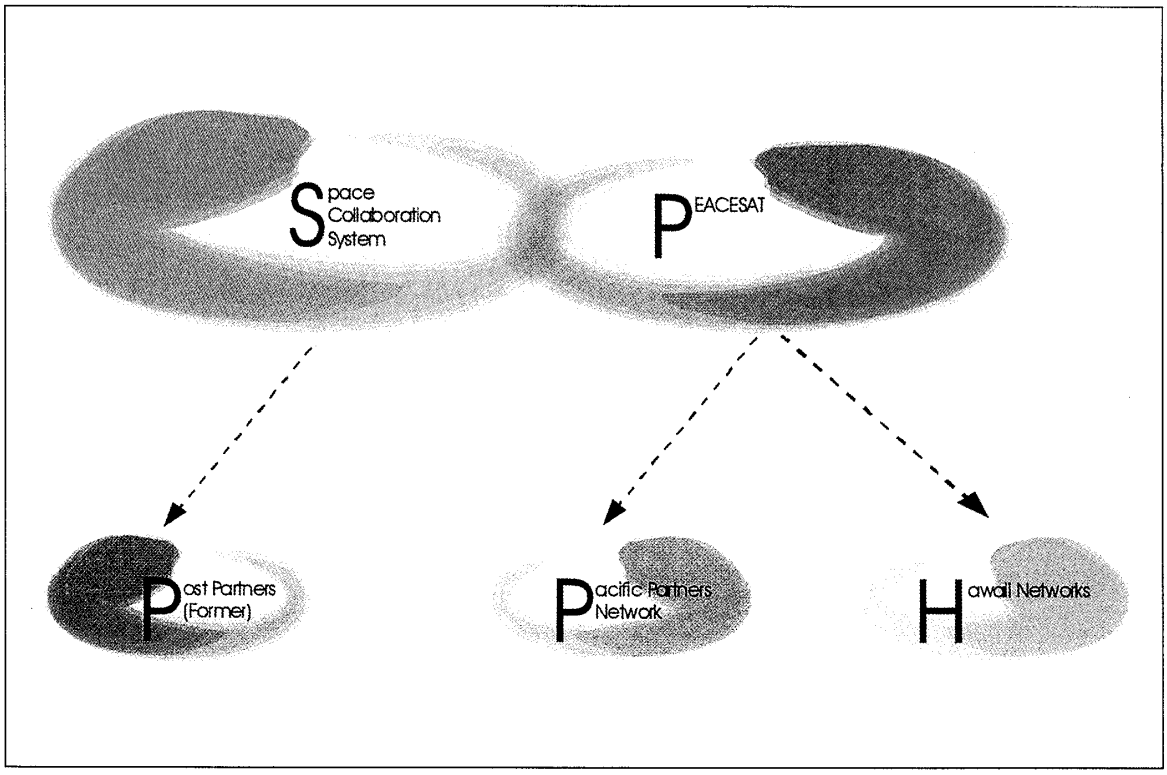
6. HHSC is the fourth largest public hospital system in the United States. It's operating budget is approximately US$275 million, a total of 3,200 employees and 1,250 beds on five Hawaiian islands (HHSC, 2002).

Table 5: Summary of Project Relevant Equipment at TIPG/PEACESAT

Video Codecs	(2) Polycom ViewStation V.35 (2) Polycom ViewStation FX (1) Polycom VS4000 (3) Polycom ViaVideo (1) PictureTel Venue
Bridge	(1) PictureTel Montage 570: * H.320 (up to 14 sites) (1) Accord MGC-100: * H.320 (up to 16 sites) * H.323 (up to 12 sites) (2) PRIs for ISDN sites (up to 6 @ 384Kbps) (1) RadVision MCU-323: * H.323 (up to 9 sites @ 384Kbps)
Gateway/Gatekeeper	(2) RadVision L2W-323 One Gateway currently supports two sites transcoded between H.323 and H.320 via ATM. The second Gateway currently supports one site transcoded between H.323 and H.320 via ISDN.
ISDN	(2) PRI ISDN (18) BRI ISDN
Firewall	(1) SonicWall Pro 200 Used to protect PEACESAT Digital Data users in the Pacific. (1) SonicWall Pro 300 Used to project internal TIP-G users on the UH network, including VTC codecs. (1) Cisco PIX 520 Used to protect internal TIP-G users on the TWTC/PLNI network (1) InstaGate EX2 Used for testing purposes. (1) Linksys EtherFast Cable/DSL Router Used for testing purposes.
Routers	(4) Cisco 2500 (1) Cisco 2600 (1) Cisco 3640 (1) Cisco 3662 (1) Cisco 4000 These routers support all of our varying data connections to entities throughout the Hawaii and Pacific.

Source: Lance Shinsato, Computer Specialist, TIPG

Figure 4: Interconnection of Networks



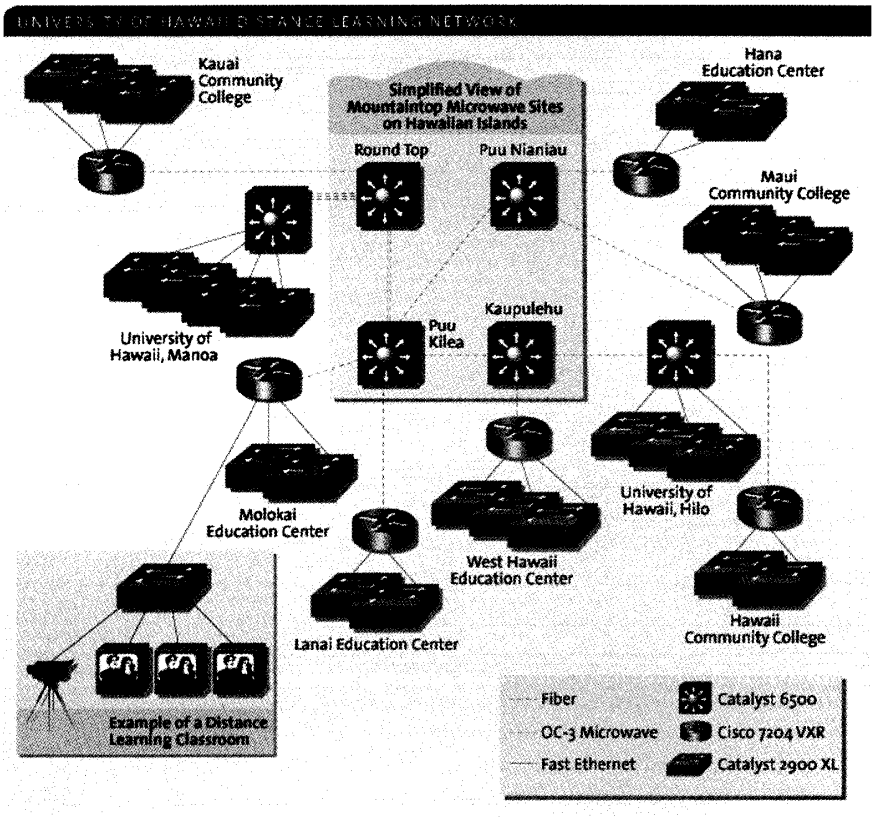
& Higa, 1999). There is a DS-3 from the TIPG NOC to SPAWAR. SPAWAR has an OC-3 to Kauai and Maui, of this the STAN Network is allocated a 6Mbps sustainable data rate with the capacity of bursts up to DS-3.

STAN is a consortium of many agencies and organizations in Hawaii. It is unique in that it is supported by the State, Federal, Military and private sector. A major funding support is through the U.S. Universal Service Program and specifically the Rural Health Care Program that subsidizes the cost for telecommunication services for health care providers in rural areas. Network central points are the TIPG NOC and HHSC headquarters on Oahu. Dr. Norman H. Okamura is the primary technical architect of STAN and TIPG manages the network activities. Please refer to Appendix F for more information.

University of Hawaii Distance Learning Network

The University of Hawaii (UH) has a very extensive distance learning system that connects the UH systemwide campuses including ten campuses and five education centers across six Hawaiian Islands. UH began to use analog interactive video for distance learning between three islands in the mid-1980s and expanded to statewide usage in 1990. Interactive video services are now provided through the completely IP-based digital interisland network. The applications include interactive low latency MPEG2 digital video teleconferencing at 4Mbps, access to voice services over IP soon

Figure 5: University of Hawaii Distance Learning Network



Source: Packet Magazine
http://www.cisco.com/warp/public/784/packet/oct01/enterprise.html

to be deployed. The network infrastructure consists of OC3 fiber optic connections between major islands and OC3 microwave links.

UH has a Radvision MCU and a PRI ISDN circuit. The analog matrix switch and network equipment are also still in place. Cable television channels are used for broadcasting educational programs for students to receive at home by public access television. The University of Hawaii has primarily implemented WebCT.

Figure 5 is a network diagram that appeared in Cisco's Packet Magazine.

Hawaii State Department of Education Network

The Hawaii State Department of Education also has several video teleconferencing locations and a PictureTel Montage bridge. The TIPG and Hawaii DOE bridge is capable of cascading or connecting one bridge to the other. Through the SCS connection to PEACESAT, direct connections to Hawaii's K-12 schools are also possible. The Hawaii State Department of Education uses WebCT for on-line course management.

Pacific Partners Networks

American Samoa DELTA and E-Rate Networks

The American Samoa Distance Education Learning and Telehealth Applications (ASG DELTA) consortium[7] is made up of the all the major government agencies and educational institutions. The American Samoa Telecommunication Authority donated a 384Kbps circuit[8] from LBJ Tropical Medical Center to the TIPG/PEACESAT NOC to be used strictly for public service. The E-Rate network provides a T-1 and fractional T-1 off island for Internet and video teleconferencing services. All public and private schools in American Samoa has access to the Internet and video teleconferencing services. See Appendix G for technical details.

Samoa-American Samoa Link

The Samoa-American Samoa Link (SAS) is a public service telecommunication connection, 960 Kbps, between Samoa (formerly Western Samoa) and American Samoa. The National University of Samoa and the National Hospital utilize the SAS connection for video teleconferencing and Internet. Appendix H contains a network diagram of the SAS Link.

Commonwealth of the Northern Mariana Islands (CNMI)
Partners in Distance Learning Network

The Commonwealth of the Northern Mariana Islands implemented a network that includes the Public School System, Office of the Governor, Electronic Data Processing Center and the Commonwealth Health Center. There is a T-1 connection from Tinian and Rota to Saipan. The E-Rate funded network consists of Layer 3 switches with Gigabit on-island network links, ATM access concentrators, Sonic Fire Wall, Gateway and H.323 MCU. There is a T-1 connection to TIPG /PEACESAT NOC. There are more than 18 video teleconference locations in CNMI. Appendix I contains a network diagram.

Guam Education Network

The Guam Education Network consists of the University of Guam and Department of Education. The Guam Educational Network utilizes ATM access concentrators, Layer 3 Switches, an MCU and gateway. The off-island connection for the Guam E-

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7. The American Samoa DELTA consortium members include: Office of the Governor, American Samoa Power Authority, Department of Education, American Samoa Community College, LBJ Tropical Medical Center, Department of Health, American Samoa Telecommunication Authority and PEACESAT of the University of Hawaii.
8. Dr. Norman H. Okamura introduced the concept of digital compression techniques to the American Samoa Telecommunication Authority (ASTCA). ASTCA compressed its existing telecommunication link and with the bandwidth savings was able to donate the 384 Kbps circuit.

Rate network is a T-1 to the TIPG/PEACESAT NOC for Internet and video teleconferencing services. Refer to Appendix J for a conceptual network diagram.

High Speed Networks in Japan & Japan/ Hawaii Connectivity

The SCS/PEACESAT Integration Project required an investigation of various network connections between Japan and Hawaii primarily to seek optimal bandwidth alternatives for video over Internet connectivity. A review of these individual networks was conducted to identify possible alternative network connections for NIME.

At the start of the project NIME was connected through the University of Chiba to the Science Information Network (SINET) using a T-1 connection. In September 2002, this network connection was increased to 100 Mpbs. The SINET is a peering network of IMNet, the Japan Inter-Ministry Research Information Network via a 100 Mpbs connection. Since the IP over video connections were relatively stable, there was no further investigation for seeking larger bandwidth capacity to the general Internet.

The various network connections available in Japan and to the Internet are documented in this report. In reviewing these options, the most promising potential upgrade between NIME and PEACESAT is a connection to the APAN network. According to Dr. David Lassner, Chief Information Officer, University of Hawaii, a 155 Mbps link between the University of Hawaii and the APAN-Tokyo site (Ohtemachi, Tokyo) is pending implementation. The IMnet is a node of the APAN network and therefore routes could be established for NIME's interconnection to the University of Hawaii through existing network links. This will significantly increase the throughput and enhance performance.

Japan has four different network connections to the Abilene Network, as non-U.S. National Research and Education Networks (NRENs). The Abilene network backbone consists of gigaPops or ultra high bandwidth points of presence to Internet2 universities and other high performance research networks. Following is a summary of the networks available in Japan. Appendix K contains specific network details and network diagrams.

> ***APAN*** - The Asia-Pacific Advanced Network (APAN) is a non-profit international consortium for the promotion of international collaboration in research and development in advanced networking applications in the Asia-Pacific region. APAN is an extensive network connecting Japan to: Europe, Korea, China, Hong Kong, Thailand, Vietnam, Philippines, Malaysia, Sri

Lanka, Singapore, Indonesia, Australia and USA. TransPAC provides high performance international Internet service connecting the APAN to the ***vBNS*** and other global networks for the purpose of international collaborations in research and education [via Pacific Wave, STAR TAP].
Source: http://www.apan.net; http://www.ucaid.edu/abilene

GEMnet - The Global Enhanced Multi-functional network (GEMnet) is operated by NTT Research to connect universities and corporate research laboratories in Japan via SNVL, STAR TAP.
Source: http://www.ucaid.edu/abilene

IMnet - Inter-Ministry Research Information network via TransPAC promotes the distribution of research information among national ministries, public corporations and institutes in Japan. IMnet consists of nearly 100 members with central NOCs in Fukuoka, Osaka, Toykyo, Tsukba, Sendai, and Sapporo. Network connection data rates range from T-1 to Gigabit speeds. The network is managed by the Japan Science and Technology Corporation. Peering networks include: APAN, ITRC, JOIN, Kreonet, PWCP, SINET, WIDE
Source: http://imnet.jst.go.jp/en/aup.html ; http://www.ucaid.edu/abilene

SINET - Science Information Network, operated by Japan's National Institute of Informatics (NII) which connects universities and research institutes in Japan [via SNVL]. The network is based on ATM and IP protocols and is restricted to academic research and international cooperation. There are more than fifty nodes on SINET.
Source: http://www.sinet.jp/index.e-html ; http://www.ucaid.edu/abilene

WIDE - The Widely Integrated Distributed Environment (WIDE) is connected to the Abilene network via SNVL for IPv6 , TransPAC. WIDE interconnects many global institutes and in Japan including the Japan Network Information Center, Engineering and Planning Group/ IP and Network Operations Group. The Keio University is the point-of-contact between the Japan Advanced Internet Research Consortium and the U.S. University Corporation for Advanced Internet Development.
Source: http://www.wide.ad.jp/index.html; http://www.ucaid.edu/abilene

Interconnection between SCS and PEACESAT

Technical Options for Connection

A comprehensive review of the various methods and issues of integrating the two networks were studied and separated into two categories: immediate and potential long-term options.

The immediate methods of connectivity trialed and tested were *ISDN* and *IP*. One of the early suggestions was to increase NIME's bandwidth to the University of Chiba. As previously mentioned a T-1 to 100 Mpbs upgrade was completed. In seeking the most cost and technically sound alternative, a few potential long-term options were reviewed, these options are summarized here:

PEACESAT Earth Station at NIME: A direct connection between SCS and PEACESAT could be established with a PEACESAT earth station located at NIME. The GOES-7 satellite footprint includes Japan. Also, during the time of the study PEACESAT officials were seeking the cooperation of the Japan Meteorological Agency and the National Space Development Agency for the use of GMS-5. NIME could serve as a hub for cross connecting PEACESAT locations to the SCS Network.

The cost implications are minimal as PEACESAT could furnish a complete earth station (by relocating a system from an inactive site). Cost considerations include shipping, installation, operations and maintenance. The antenna location could pose a potential problem. The standard PEACESAT antenna without a radome is not sufficiently rated to withstand the high winds in Chiba. Although the NIME parabolic dish antennae are rated to withstand very high wind gusts and are located on the NIME building rooftop, a major benefit of this option is the elimination of metered fees (such as incurred in the ISDN option).

Former Post Partner Connections:

Manila, Philippines: A SCS connection to the former Post Partners connection at the Anteneo De Manila University in Manila Philippines is another alternative. PEACESAT is investigating potential collaborative efforts with the Asia Development Bank and others in establishing a telecommunication link between Manila and Honolulu.

Suva, Fiji: Similar to the option described above, a connection could be established between SCS to the Post Partners earth station at the University of the South Pacific in Suva, Fiji to the PEACESAT earth station in Fiji and cross connected to University of Hawaii/PEACESAT.

There are potential complications with a former Post-Partner, SCS, PEACESAT scenarios. First the Post Partners frequency license is expired and must be renewed as the authorized project period has ended. Secondly reservations and satellite coordination would be difficult between the JCSAT and/or Superbird requests and double satellite hops may be problematic. The benefit of implementing a former Post Partners connection is that it opens opportunities for expanding outreach between the Asian and Pacific Islands region. The network objectives and mission of research, education and health applications also complement each other.

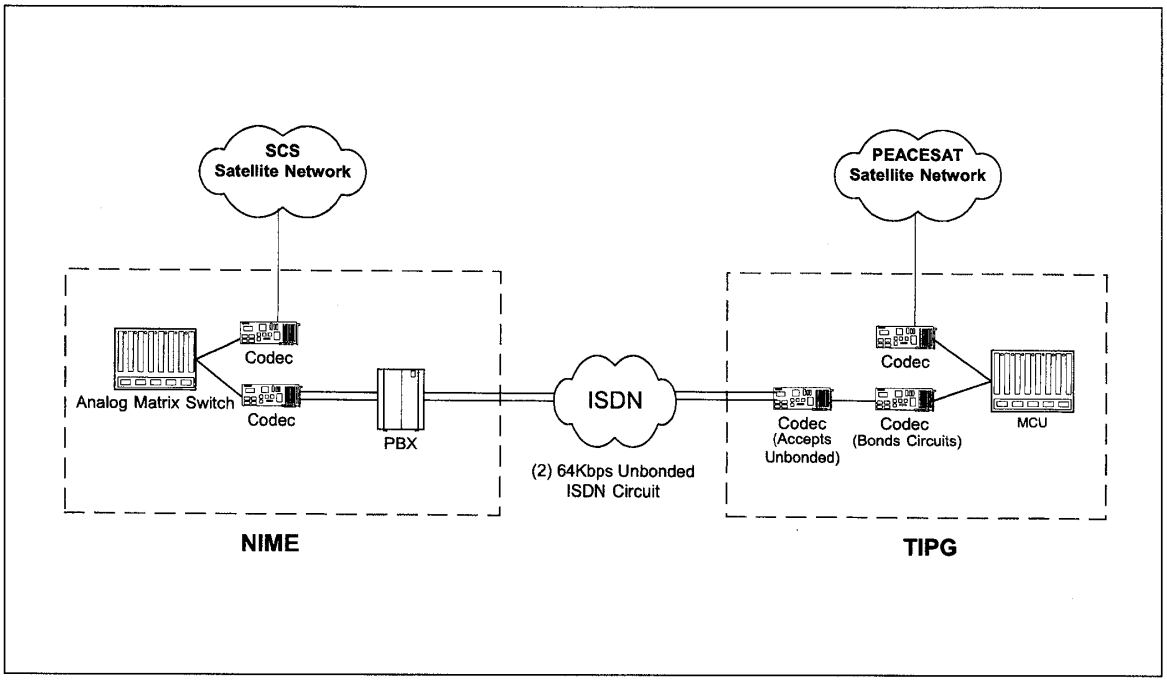
JCSAT: The potential for use of the commercial JCSAT satellite links between Japan and Hawaii is another option that was not fully investigated. Initial inquiries resulted in no clear or easy connection to JSCAT in Hawaii, however this option has potential for future developments.

Tested Methods of Interconnection

ISDN

The first interconnection test used ISDN (H.320), a video matrix switch and multipoint conferencing units. The technical set-up is depicted in Figure 6. An ISDN connection was established using two unbonded 64Kbps BRI circuits at NIME, through a Pheonix Mini codec, to the SCS analog matrix switch. This switch and patch panel interconnected the SCS digital satellite modems and codecs transmitting on JCSAT-3. The ISDN connection was made to the PEACESAT video teleconferencing bridge where the PEACESAT digital satellite modems were also

Figure 6: Interconnection via ISDN



connected to the bridge.

The two 64Kbps circuits for one 128Kbps link was the only ISDN option available from NIME's main PBX. Higher speed tests would have been preferable for comparison however for cost considerations, 128Kbps was used as a realistic and affordable operational data rate. An issue was that the PictureTel Montage video teleconferencing bridge at PEACESAT is not able to accept unbonded ISDN circuits directly. As a temporary set-up a second codec was used to pass the signal from the first receiving codec to the bridge. This slightly degraded the video quality (Kondo & Higa, 2002).

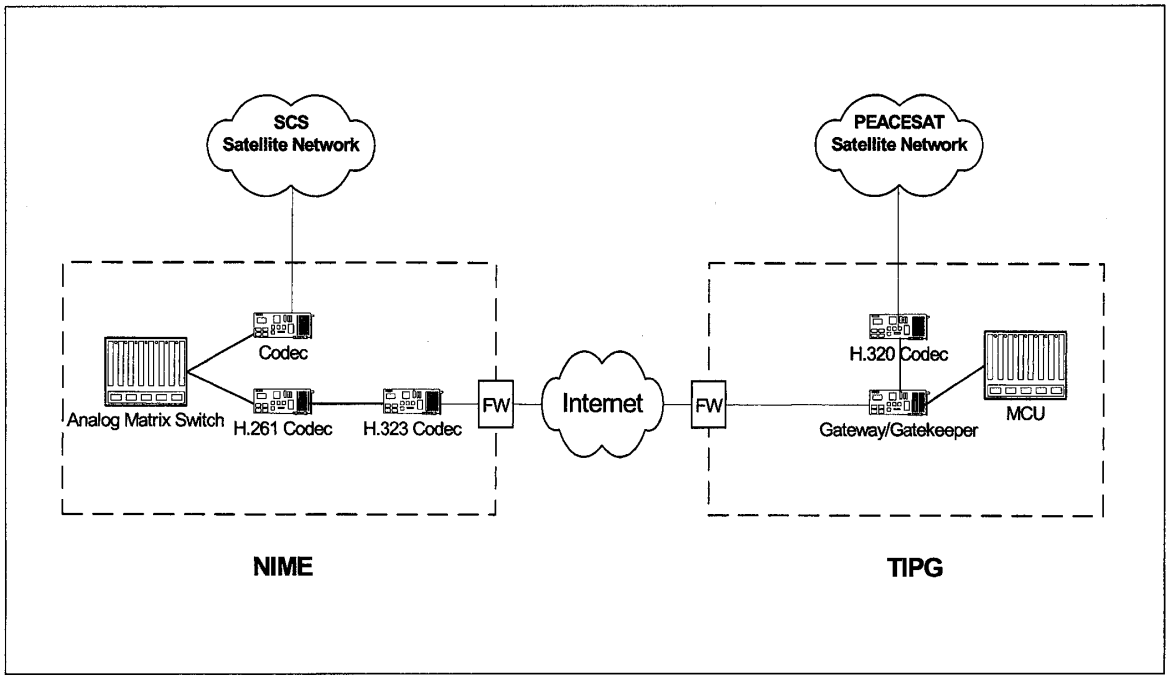
A survey conducted indicated the majority of participants rated the quality of audio and video satisfactory for distance learning; ease of operation and set-up was also rated high (Kondo & Higa, 2002).

The most limiting factor is the hourly ISDN cost. The cost between Hawaii and Japan is approximately US$200 per hour.

Internet Protocol (IP)

IP employing H.323 protocol for video conferencing was the second type of connection test completed between SCS and PEACESAT. Figure 7 is a conceptual technical diagram of the configuration.

Figure 7: Interconnection via IP



During the time of testing, NIME's Internet connection through the University of Chiba and the Science Information Infrastructure Network (SINET) was through a T-1 connection shared among all general Internet and email users at NIME.

Controlled Quality of Service (QOS) is possible within a closed network whereby each router can be configured to manage QOS. However the very nature of cross connecting various networks and traversing the general consumer Internet decreases the probability one will have control of each router in the path between two video teleconferencing points.

In the SCS/PEACESAT interconnection the Quality of Service (QOS) cannot be guaranteed however it is anticipated that with increased bandwidth it is less likely that the circuits will be congested. Therefore continued investigation of the large bandwidth connections between Hawaii and Japan is recommended. For example, as stated previously in this report, it would be extremely beneficial if NIME can access the future APAN 155Mbps connection to the University of Hawaii. As ultra high speed international networks develop such as Internet 2, IP video teleconferencing will become more reliable and stable.

There are more obstacles in using video over IP than ISDN. Firewalls add expected complications and require special configuration for H.323 video teleconferencing. First, if the firewall is providing Network Address Translation (NAT) a conduit must be established between the public IP address and the internal address. The codec system located behind the firewall is assigned an internal address; in order for an outside codec to call this internal codec a conduit must be established. Secondly, the correct ports on the firewall that are related to video teleconferencing communication must be opened. There are two types of protocols TCP and UDP. The TCP ports are: 3603, 1503, 1720, 3230, 3235 and the UDP ports are 3230 thru 3235. Opening these ports will allow H.323 traffic through the firewall (Kondo & Higa, 2002).

Network security is a serious consideration for some organizations and institutions. It was found in working with various universities that some did not authorize the required firewall reconfiguration for H.323 traffic. Others allowed only limited access such as enabling the capability to originate outgoing calls, this added some control of incoming H.323 traffic. Another mechanism for increased security is to restrict the open ports of the firewall to specific IP addresses or subnets. This would allow only authorized IP addresses access through the firewall. All of these measures however are not full proof and for organizations or universities that demand high security, H.323 video conferencing may not be allowed at all (Kondo & Higa, 2002).

Evaluation of Video Sessions

The effectiveness of the ISDN and IP interconnection for distance learning applications was measured by reviewing the following:

1. Technical Performance & User Satisfaction
2. Network Operation and Coordination
3. Cost Factors

Performance Qualities

Overall the added satellite delay between the two networks was inconsequential to the participant's satisfaction in conference performance.

One initial concern in connecting users of SCS and PEACESAT was the large difference in data rates and video quality. The overall conferences were held in mixed data rate mode with a range from 128 Kbps to 1.544 Mbps in a single conference enabling each site to connect at their optimal connection speed. Although participants using the SCS system received lower data rates from PEACESAT, they still scored the video quality as sufficient for administrative meetings and distance learning courses in both ISDN and for most part in IP connections (Kondo & Higa, 2002).

In comparing the performance between the ISDN and IP connection, the IP link was more problematic. It was slightly poorer in video quality and more susceptible to interruptions (frozen video, pixelization, no audio or video, etc.) (Kondo & Higa, 2002). Approximately one of ten conferences was cancelled because of poor connectivity so the confidence level of using IP is still tentative. The J-Net operation is completely based on IP video and J-Net officials also report similar issues in using IP video. Although the general consensus still regard this method of interconnection as suitable for distance learning (Kondo & Higa 2002) probably weighing cost effectiveness and affordability over reliability.

In recognizing the potential problems of using IP video teleconferencing due to unpredicted network congestion, as an operational procedure, SCS and PEACESAT will use ISDN as a back-up. It is expected that the ISDN video will also improve with a direct connection from the NIME codec to the PEACESAT bridge without going through the second codec at PEACESAT to accommodate for the unbonded ISDN circuits (Kondo & Higa, 2002).

Set-Up, Operations and Network Coordination

Set-Up

There are differences in the initial set-up of the ISDN and IP connections. ISDN installation is fairly straight forward requiring installation of the circuits by the telecommunication carrier. The IP connection is more complex as it requires more

coordination with the respective Information Technology (IT) departments for the configuration of the firewall settings. Also if the university policy does not permit H.323 traffic through the firewall, video teleconferencing over IP will not be feasible (Kondo & Higa, 2002).

Operations

The ISDN and IP connections in terms of ease of operation are generally equal, simply requiring either the ISDN or IP number for dialing. The cross connection at NIME to SCS is also basically the same for both methods of connection. Appendix L documents the physical connections for connecting the codec and ISDN lines to the analog matrix switch. At NIME the operation of the analog matrix switch and patch panel could be simplified with the use of a multipoint conferencing bridge that is able to connect multiple sites and protocols.

Network Operations

NIME and PEACESAT operate individual Network Operation Centers. There are no standard operating and scheduling procedures nor established fee structures, for use of joint network services. These must be developed as network usage increases.

There were language barriers between the SCS and PEACESAT NOC operators. However the interface between operators during the set-up and test phases was more frequent than it will be during a standard video teleconference set-up. Since the initial technical configurations are now established, the interaction between NOC operators will be limited. It is expected that the conference coordinators will be primarily responsible for arranging schedules and accommodations (i.e., conference room set-up, peripheral equipment needs, etc.). It is anticipated that the conference coordinators will be able to communicate with their respective operators and be able to assist in translation should the need arise.

Cost Effectiveness

A SCS/PEACESAT conference will incur the cost for the SCS satellite transponder time and the interconnection costs if using ISDN. The SCS fees are US$200 (24,000¥) per hour a total cost that can be divided among all sites in the conference. The ISDN fees generally include monthly recurring costs for the circuit and per minute fees that are based on the cost of a long distance telephone (at 64 Kbps) multiplied by the amount of 64 Kbps circuits required for the video teleconference. Table 6 provides a cost comparison between ISDN and IP and approximate ISDN rates between Hawaii and Japan. The IP scenario does not completely eliminate all interconnection costs. There are required fees for connection to the Internet and larger bandwidth capacity increases expected performance and increases cost. The obvious benefit is the elimination of metered fees.

Figure 8: Video Teleconference using ISDN to connect SCS and PEACESAT

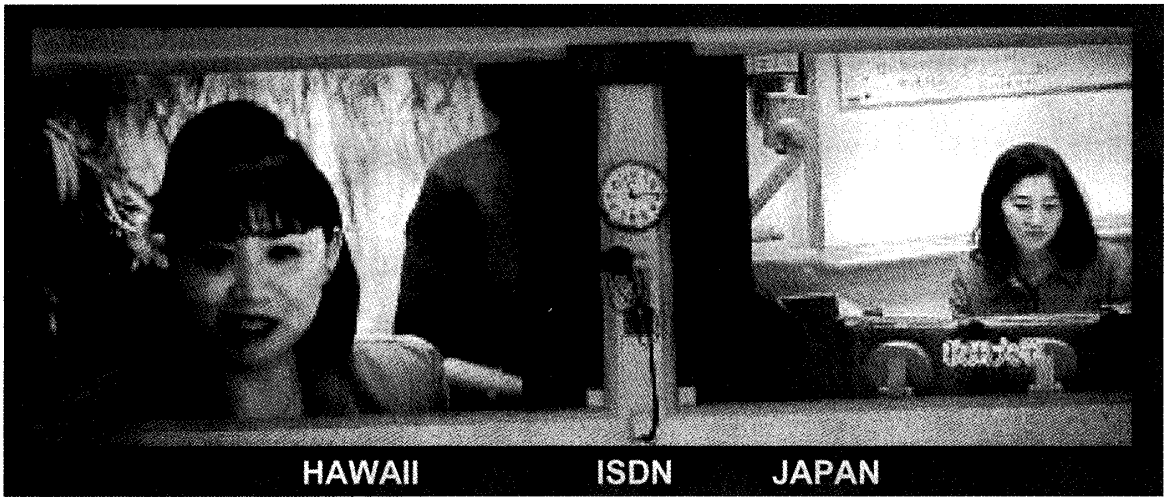


Table 6: Cost Comparison - ISDN vs. IP

ISDN	IP
Monthy Recurring Costs	Internet Connection Costs
Metered Fees	Metered Fees Eliminated
High International Tariffs	
@ $1.30/Minute per 64Kbps (160¥)	
- $156/Hour = 128Kbps (19,000¥)	
- $468/Hour = 384 kbps (57,000¥)	

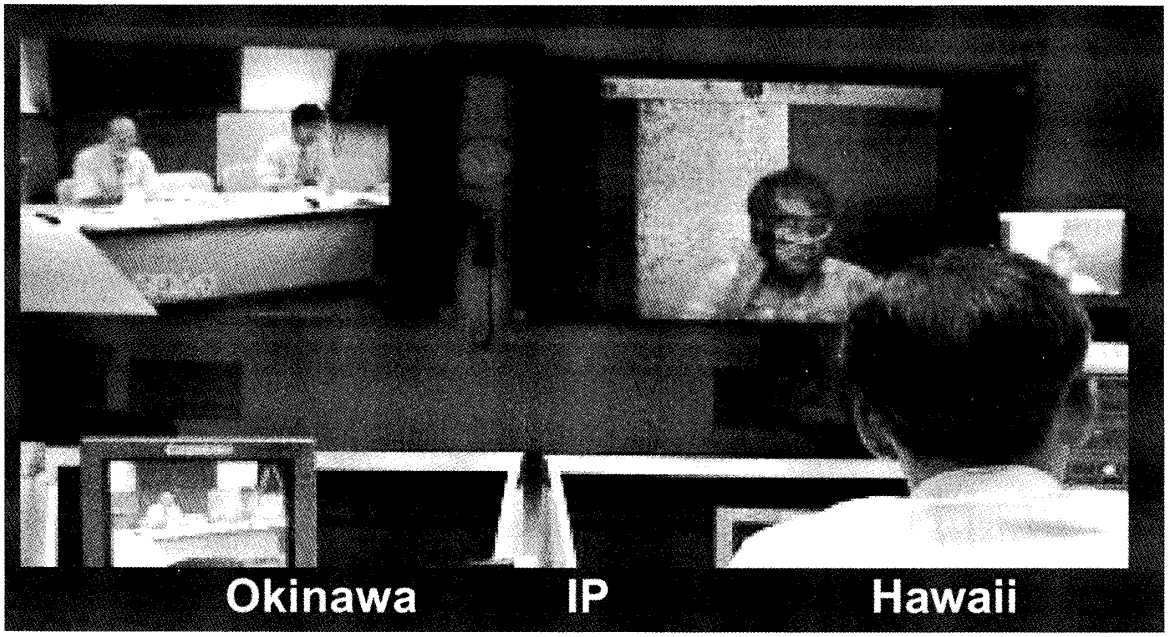
Feedback from the majority of network users interviewed indicates cost as one of the most critical factors related to frequency of network usage. Many network users are very pleased with overall technical performance and potential of using global learning networks however in both Japan and the Pacific Islands using SCS and/or the SCS/PEACESAT connection via ISDN is cost prohibitive. Many users indicate a desire for increased distance learning programs via video teleconferencing however the current fees are restrictive. This is the main reason that IP video is more promising for distance learning, in the SCS/PEACESAT scenario, despite its current QOS issues.

Selected Technical Solution

The near-term solutions of SCS and PEACESAT are by ISDN or IP. IP is the preferred method of connection with ISDN as a back-up alternative. The IP tests conducted during this project was through a lower cost Polycom Viavideo system that is intended for desktop video teleconferencing. The good results of these initial tests prompted NIME to invest in a more complex H.323 codec, a Polycom FX unit.

This has increased NIME's capability for H.323 conferencing. The codec is both H.323 and H.320 compatible and supports multipoint conferencing of up to four 384 Kbps sites or three 512 Kbps sites. It has interfaces for computer input, external cameras and also supports video streaming over the Internet. The Internet bandwidth upgrade from 1.544 Mbps to 100 Mbps will also assist in IP video performance from NIME.

Figure 9: Video Teleconference using IP to connect SCS and PEACESAT



Section IV: Phase 2 - Program Development

Following are summaries of Pacific Island institutes of higher education accessible via PEACESAT; included are short descriptions of the institute's background, telecommunication capacity, existing distance learning programs and any expressed or initial interest in working with institutes and organizations in Japan and potential utilization of the SCS/PEACESAT connection.

National University of Samoa

Contact Information
Le Iunivesite Aoao o Samoa
(The National University of Samoa)
P.O.Box 5768
Apia, SAMOA
Telephone: 685-20072
Http://www.nus.edu.ws/

Background

The National University of Samoa (NUS) was established in 1984. NUS provides Bachelor of Arts degrees in the faculties of Arts, Commerce, Education, Nursing and Science. There are certificate programs and a 'University Preparatory Year (UPY)' program to assist in preparing students for entry to full university level course offerings <http://www.nus.edu.ws/>. Also NUS is renowned for its 'center for excellence in Samoan Studies.'

Average student enrollment is approximately 1400.

Distance Learning Programs

According to NUS President and Vice Chancellor, Mr. Magele Mauiliu, NUS currently provides an in-service mathematics course for the American Samoa Department of Education using Internet and video conferencing NUS is interested in developing additional courses building upon their distance learning infrastructure.

Telecommunication Capabilities

The Samoa-American Samoa (SAS) link connects NUS to American Samoa using a 960 Kbps circuit. Video teleconferencing, voice and data communication services are available through the SAS network connections. The National Hospital is also connected with video teleconferencing capabilities. There are plans for data access to the elementary and high schools however dial-up connections remain problematic due to the cost prohibiting factor of the local telephone per minute fees.

NUS is equipped with numerous computer laboratories and training facilities.

Program Interest

President and Vice Chancellor Magele actively supports international collaboration with Japan; it is evident in the numerous Memoranda of Agreements (MOA) between NUS and institutes of higher education in Japan. Currently NUS has established MOAs with: Waseda University; APU Ritsumeikan Asia Pacific University; Ritsumeikan University; Nagano College of Nursing; University of the Ryukyus, and Tomakomai Komazawa University.

There are several Japan volunteers at NUS. At the executive level a Japanese expert advises the President and Vice Chancellor on telecommunication network system design and ICT. At the teaching level Japanese Senior Volunteers and JOCV's are employed as teachers to assist with the University's human resource planning. Currently these volunteers are teaching courses in the fields of technology, Japanese language, education and computing.

NUS also has strong ties to JICA. JICA funded the construction of the new NUS campus at its present location; total cost is approximately US$26 Million. The construction included classrooms, science laboratories, lecture theaters, audiovisual center, administration block, staff offices, library, canteen, and a large fale (traditional Samoan meeting house).

NUS has many potential applications of the SCS-PEACESAT connection. Considering the many JICA projects, it would be beneficial for NUS to participate in JICA J-Net programs. Since NUS is not a J-Net node they may be able to participate through a connection from the SCS-PEACESAT to J-Net. NUS is also seeking a cultural exchange between Okinawa, Samoa and American Samoa.

University of Guam

Contact Information
President's Office
UOG Station , Mangilao, Guam
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http://www.uog.edu
Accredited by the Western Association of Schools and Colleges

Background

The University of Guam was established in 1952 initially as the Territorial College of Guam, a teacher training college. Today the University of Guam offers

Bachelor and Master degrees in Agriculture and Life Sciences, Arts and Sciences, Business and Public Administration and Nursing. According to the UOG Web Site, in Fall 2001 241 degrees were issued and current student enrollment is approximately 3165 with 305 faculty.

Distance Learning Programs

UOG has provided distance learning interactive programs since late 1980s. UOG PEACESAT is one of the more active stations in the network and plays a role as the hub for the Micronesian region. Distance learning nursing courses are provided throughout the region (a program funded in part by the Sasakawa Pacific Islands Nation Fund). UOG PEACEAT is also instrumental in the facilitation of telehealth and telemedicine consultations and disaster and emergency management preparedness for the region acting often as a liaison between lost ships or canoes at sea and the US Coast Guard.

On-line courses were first offered in 1998. These courses are provided for both local students in Guam and others through the Internet. The on-line courses extend the opportunities for flexibility in student schedules and enable the on campus student to visit professors during office hours for additional assistance. Some of the courses provided on-line include ED 488/G Law for teachers, ED 451 AV Methods and courses in Micronesian History. UOG continues to refine and develop its on-line and distance learning course offering.

Telecommunication Capabilities

The University of Guam is equipped with multiple PEACESAT earth stations that are capable of interactive video teleconferencing and digital data services. UOG recently implemented an Accord multipoint conferencing unit and has ISDN connectivity primarily for on-island as international ISDN circuits remain costly. UOG telecommunication infrastructure enables cross connection of various networks in the Asia-Pacific region. The PEACESAT network operations center connects the Guam Education Network, UOG's local FDDI fiber network to the Pacific Islands PEACESAT locations. UOG PEACESAT has an operations staff that facilitates daily programs and manages network scheduling and program requests.

The UOG PEACESAT station networks multiple H.320 and H.323 video teleconferencing studios located across the UOG campus, nationally and internationally.

Program Interests

The University of Guam is currently establishing ties with China for student exchanges and or collaborative research projects. UOG is interested in a joint

venture with the Guam Department of Education in providing higher level Japanese language courses in the junior and senior high school levels. Interest was also expressed in having intercultural and interactive programs between students in Guam and Japan.

UOG President Harold Allen was one out of ten nominated by the Japan Foundation through the Consulate-General Office in Hagatna, Guam to participate in their short term Visitor Invitation Program to promote international cultural exchange and will be very involved in international conferences, academic meetings, lectures and workshops in Japan during 2003.

According to Dr. Hiro Kurashina, Director, Micronesian Area Research Center, MARC, UOG has strong alliances with a number of Japanese institutions. There has been an on-going exchange program for many years between the UOG Marine Lab and the University of Ryukyus in Okinawa. MARC works collaboratively with the Okinawa International University. UOG is in the process of formalizing a relationship with Meio University in Nago, Okinawa through Dr. Nakachi, a former UOG professor. Dr. Kurashina reports that UOG has had excellent relationships with the National Museum of Ethnology in Osaka and the Pacific Society in Tokyo.

There are Guam-Japan relationships in other training and exchange programs such as English language institutes for Japanese students. The convenience of Guam and Japan's close proximity is attractive to Japanese students. There are numerous exchange programs such as Rotary Club, elementary school programs and other sister city related activities. Also Japanese students benefit from CPA and other certification tests administered in Guam.

The SCS/PEACESAT connectivity can play a key role in developing and maintaining some the above mentioned program relationships.

College of Micronesia

Contact Information
Federated States of Micronesia
P. O. Box 159, Kolonia, Pohnpei, 96941
Phone: (691) 320-2480
http://www.comfsm.fm/
Accredited by the Western Association of Schools and Colleges

Background

The College of Micronesia (COM) serves the Federated States of Micronesia with

a National Campus in Pohnpei and extension campuses in each state (Chuuk, Kosrae and Yap). COM offers two-year associate degrees in liberal arts including: health careers, education and media studies and associate of science degrees in: accounting; general agriculture; business administration; computer information systems; early childhood education; hotel and restaurant management; marine science; Micronesian studies; teacher education-elementary and teacher education-special education (College of Micronesia, 2002). COM also provides nursing prep courses for students that will transfer to full nursing programs offered at other educational institutions. One-year certification programs and vocational education is also emphasized at the college.

Distance Learning Programs

In 2001, COM offered its first distance learning courses completely on-line. COM together with the San Diego State University received a U.S. Department of Education grant to develop and implement on-line courses. To date 400 students have completed these on-line courses and have adapted well to this new learning environment.

The courses are designed with web based student exercises, discussion boards and email. Dreamweaver is the course management system used. Currently the four courses offered on-line. These are 300 level courses that would not otherwise be taught at the state campuses. Each state has a course facilitator that coordinates the course at the state level. There are instructors in all of the states that are qualified to teach these courses; the lead instructor from each campus is on a rotating schedule.

The San Diego State University provides COM faculty development in on-line course design and delivery. There is also a Master's Degree program available on-line from San Diego State University with enrollment from students of the Federated States of Micronesia.

Telecommunication Capabilities

The network connections and access to the Internet has improved for COM significantly. The National campus in Palikir has a 512Kbps connection to FSM Telecom for Internet services. There are plans to upgrad the connection to a 1.544Mbps link. The State campus' are connected to Palikir with 128Kbps links.

Due to the limited amount of home computers and high cost of Internet access very little students access the courses from home. Each state campus has a computer laboratory where the students pay a small lab fee of approximately $50 each. Here the students are able to access their on-line courses.

COM is also the host to a PEACESAT 3m earth station that is capable of interactive video teleconferencing. A second PEACESAT earth station is located at the National Hospital. In each of the states of FSM there is a PEACESAT earth station situated at the Department of Education in Chuuk, Kosrae and Yap.

Program Interests

In a video teleconference interview, Dr. Michael Tatum, President of COM expressed interest in any future teleconferences with Japan to discuss potential programs that may benefit COM students. It was expressed that Japanese language exchange programs are of great interest. Yap state offers a good example of the need for Japanese language instruction at COM. Yap High School (student population 600) provides Japanese language courses however the COM Yap campus does not because of the lack of an instructor. Graduating high school students are without opportunity to further their studies in Japanese language.

Culture exchange programs, English courses, international relations and business courses are additional subject areas of interest.

COM signed a MOU with the University of the Ryukyus Center for Asia and Pacific Island Studies for collaboration and partnership in necessary and applicable research projects.

Figure 10: President Tatum, College of Micronesia with Staff
(Video Teleconference via IP)

College of the Marshall Islands

Contact Information
Republic of the Marshall Islands

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Web: http://www.cmiedu.net/
Accredited by the Western Association of Schools and Colleges

Background

The College of the Marshall Islands (CMI) is a two year college that is the national institute of higher education for the Republic of the Marshall Islands (RMI). CMI has a historical relationship with the College of Micronesia and at one time was an extension of COM. In 1993, CMI was established as a completely separate educational institution with an independent President and Board of Directors. Today there are two main campuses on Majuro with a third campus being developed in Arrak, also on Majuro.

CMI's current student enrollment is approximately 700 with the majority of students in pre degree programs. CMI offers AA and AS degrees and certificate programs in education, nursing, accounting, business administration, computer science, and network administration that are transferable to baccalaureate colleges and universities. The network administration program is a joint project with the Bank of the Marshall Islands. The courses are held on Saturdays and are well attended. The majority of degree level students major in business and computer science.

Telecommunication Capabilities

CMI has two PEACESAT standard 3m earth stations and was the first educational institution in the Pacific Islands to implement the digital PEACESAT services for continued data and Internet operations. The PEACESAT system is capable of video teleconferences and in October 2002 CMI together with the Emergency Management Office and the Ministry of Health and Environment will implement a plan for the extension of PEACESAT services to the national library and hospital.

Program Interests

A video teleconference interview was held with Mr. Timothy Owen, Acting IT Director and Chairman of the Business and Computer Science Department and Mr. Clement Capelle, Manager, RMI, Emergency Management Network.

Mr. Owen expressed interest in programs between the CMI and educational

institutions in Japan covering the topics of intercultural business communications, management styles and computer systems. Mr. Owens has lived and operated businesses in the Republic of the Marshall Islands for more than 20 years and can offer both the American and Marshallese perspective on these topics.

Japanese language is spoken in the older generation of Marshallese and is also of interest to CMI students. CMI has a JOCV on staff teaching Japanese language. In July 2003 a JOCV computer expert will assist with the installation and training of CMI's new UNIX computer. The coordination, project management and maintenance of these volunteer activities could be coordinated through the use of the SCS/PEACESAT connection.

Finally, the College of the Marshall Islands holds a memorandum of understanding for collaboration with the Center for Asia and Pacific Islands Studies of the University of the Ryukyus. CMI is anxious to work with the University of Ryukyus on collaborative projects.

Palau Community College

Contact Information
Palau Community College
Medalaii
Koror, PW 96964
Telephone: (680) 488-2471 X225

Background

The Palau Community College offers two-year associate degrees in business management and administrative services, liberal arts and sciences, general studies and humanities, protective services, mechanics and repairs and construction trade. Student enrollment is approximately 700 and there are 32 faculty of which half are adjunct.

Distance Learning Programs

The Palau Community College in cooperation with the University of Auckland provides a general practitioners program that is a combination of traditional face-to-face meetings and video teleconference sessions using PEACESAT. The program is attended by practitioners from Micronesia and consists of courses such as: ***GenPrac 702: Philosophy of General Practice & GenPac 703: Consultation and Communications.*** Palau Community College is investigating the possibilities of providing opportunities for on-line degree programs by establishing relations with other Universities. Areas of interest are school administration (M.A.) and vocational education (B.A).

Telecommunication Capabilities

To participate in video teleconferences PCC utilizes the PEACESAT station located at the Ministry of Education or the National Emergency Management Office. The college has limited Internet access made available to students and faculty. PCC utilizes a 128Kbps DSL, a Palau National Communication Corporation service. The cost is approximately US$700 per month. This link is shared by 100 computers on campus.

Program Interest

The Palau Community College has Partnering Agreements with Waseda University, Oita University and the University of the Ryukyus. Mr. Patrick Tellei, President of Palau Community College explained that the nature of these partnerships currently involve student and/or professor exchange programs. PCC would like to explore the possibilities of enhancing culture exchanges with further interaction through video teleconferencing.

Japanese language is another program area of interest. Japanese language is a requirement for certain PCC degrees such as hospitality and tourism. JICA donated a new language laboratory and a senior JOVC teaches the Japanese courses. Palau High School also offers Japanese language classes so there is a large demand for advanced classes.

American Samoa Community College

Contact Information

American Samoa Community College
PO Box 2809
Pago Pago , AS 96799
Telephone: (684) 699-9155

Background

The American Samoa Community College (ASCC) provides two-year associate degrees in liberal arts and sciences, general studies and humanities, health profession and related services, business and administration services, law and legal studies and protective services (Solutions Advancing People, 2002).

ASCC has an emphasis on taking leadership in "researching and teaching the traditional role and status of the Samoa culture and language." (ASCC, 2002).

Average student enrollment is approximately 400-500.

Distance Learning Programs

ASCC established a program named, the Y2K Project, with an objective of launching on-line courses to meet the needs of their dispersed student population of the outer islands of Manu'a, that is comprised of three individual islands of Ofu, Ta'u and Olosega

A training program was completed last summer where ASCC faculty and Department of Education educators received intense training in the areas of on-line course development, distance learning technologies and applications, basic course syllabus and lesson planning skills for distance learning. As a result of this training several on-line courses were offered this semester. According to Mr. Sal Poloai, IT Edtech Manager, Department of Education and one of the facilitators of the Y2k Project, the new courses were geared towards three groups: Department of Education teachers, ASCC students and K-12 students. Topics included reading, writing and mathematics. The courses geared toward DOE teachers included: world geography, world civilization, Samoan language and math 150. These courses are part of the American Samoa Teacher Education Program and are prerequisite courses for the University of Hawaii Bachelors program.

Telecommunication Capabilities

The ASCC campus is on a local area network with Internet access. There are two video teleconference locations that utilize Polycom and PictureTel codecs (H.323). The systems are located in their Departments of Nursing and Continuing Education. ASCC will be installing two additional video systems to be located at the Small Business Development Center and offices.

Mr. Poloai, explained that "ASCC is a member of the Distance Education for Learning and Telehealth Application Consortium (DELTA) and currently has four strands of single mode fiber on the DELTA/PEACESAT network." Through the DELTA connections ASCC receives interactive video, audio and data services.

Program Interest

Ms. Adele Satele-Galea'i, President, American Samoa Community College explained that ASCC currently does not have any institutional relationships with Japan. She, however, expressed interest in establishing a relationship for faculty or student exchanges. Ms. Satele-Galea'i welcomes any opportunity in working with Japan and would like to be involved in any upcoming general video teleconferences for introductory purposes.

Northern Marianas College

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Northern Marianas College
As Terlaje Campus
Saipan, MP 96950-1250
Telephone: (670) 234-5498 X1100
Accredited by the Western Association of Schools and Colleges

Background

The Northern Marianas College offers Certificates and Associates in Arts Degrees. Certificate programs include: hotel operations, culinary arts, food and beverage services, hospitality management, hospitality services, accounting, business management and computer applications. The AAS degrees are in: hospitality management, computer applications, business management and accounting.

Distance Learning Programs

The Northern Marianas College has a video teleconference network connecting campuses on Saipan and Tinian. 300 level courses in algebra and children's literature geared for teacher training are provided by distance learning. Students also receive courses in geometry and sociology. The college extends the use of the system to other agencies including the police and fire department for system wide training. Cable television is used to broadcast classes.

Telecommunication Capabilities

The college has video teleconferencing capabilities to other remote campuses and limited access to the Internet.

Program Interest

There are limited Japanese language teachers in CNMI however the college according to its official web site offers the following courses listed below. Japanese language teacher training for both the college and Public School System in CNMI is needed.

> **JA 100 Conversational Japanese (3)** This is a fundamental course in conversational Japanese. Students participate in regular conversational Japanese drills to enhance their ability to speak and understand spoken Japanese. (Offered Fall, Spring, occasionally Summer)
>
> **JA 101 Elementary Japanese I (4)** This course is designed for students who want to learn basic Japanese. It emphasizes the spoken Japanese

language. Listening, speaking, reading, and writing skills are developed with emphasis on active use of these skills. Hiragana, Katakana, and basic Kanji are introduced. (Offered Fall, Spring, occasionally Summer)

JA 102 Elementary Japanese II (4) This course is designed to expand the communicative use of Japanese and to increase students' awareness of Japanese culture. The practice of reading and writing Hiragana, Katakana, and Kanji is continued and expanded. Prerequisite: a "C" grade or better in JA 101. (Offered Fall, Spring)

JA 201 Intermediate Japanese I (4) This course is a continuation of JA 102 and provides further development of grammatical and conversational skills. At this level students can communicate effectively in common, everyday Japanese. (Offered Fall)

University of the South Pacific

Background

The University of the South Pacific is currently not accessible through PEACESAT nor SCS. However as it is a major player in higher education in the Pacific Islands and for this reason a summary of the USP network and programs are included in this section.

The University of the South Pacific and USPNet is a regional university serving twelve island countries with a student population of approximately 14,000. 47% are enrolled in distance learning programs. USP is seeking accreditation for PELL grant eligibility (Chandra & Taafaki, 2002).

Distance Learning Programs

At a Pacific Island Digital Opportunity (PIDO) meeting in August 2002, Dr. Irene Taafaki, Center Director, USP Center, Republic of the Marshall Islands, emphasized the support of USP senior management in the use of technology for enhancing and expanding distance learning programs. USP promoted distance learning very early starting with the PEACESAT network in 1971. Today USP operates the USPNet that has transformed distance learning in the region. Today there are approximately 180 courses offered through real time lectures by interactive video teleconferencing or one-way video with a voice return connection.

Technical Capabilities

The USPNet is a major distance learning network that interconnects all twelve USP centers with satellite telecommunications for interactive video teleconferencing

(128Kbps). Please see Table 7 for a list of the USPNet locations. The system is capable of three simultaneous interactive conferences or video broadcasts to all sites and Internet services are provided through Fiji at commercial rates (Chandra & Taafaki, 2002). USP supports multimedia delivery of courses (Internet, video teleconferencing, etc.) and utilizes the WebCT on-line course management system.

Although technically feasible, the USPNet, PEACESAT and SCS have not interconnected; there are other restrictive issues concerned. Dr. Irene discussed the framework for some of the misconceptions that USP is not willing to interconnect to other networks.

Dr. Taafaki explained that during the establishment of USPNet each country had to negotiate with their respective telecommunication carriers whom added restrictions regarding network usage and specifically restricted the interconnection to other networks. It was also explained however that certain connections are permitted if it is through the telecommunication public switched network. Although there have been instances and experiments where USPNet has been interconnected to other networks, Post-Partners as an example (Igarashi, 2002), USP has not accepted PEACESAT's invitation to conduct experiments between the satellite networks. PEACESAT has received numerous requests for this interconnection because there are several locations that USPNet covers that PEACESAT do not have video teleconferencing capabilities. For regional organizations or meetings it would

Table 7: USPNet Earth Station Locations

USPNet
1. Fiji (Hub)
2. Samoa (Mini-Hub)
3. Marshall Islands
4. Solomon Islands
5. Tonga
6. Tuvalu
7. Cook Islands
8. Nauru
9. Niue
10. Kiribati
11. Vanuatu (Mini-Hub)
12. Tokelau

be ideal to have both networks connected.

JICA recently completed a three month study on the technical feasibility and cost effectively of replacing the current USPNet with a digital IP based network. This proposal is currently under review.

The USPNet was funded by Japan, Australia and New Zealand and was initially promoted by the Sasakawa Pacific Islands Nation Fund that assisted in the facilitation of the initial funding request.

Program Interest

USP and Japan maintains a strong relationship. Japan is the major donor of the USPNet (see section relating to 'financial aid') and is also funding an ICT Center (Siwatibau, 2002) to cater to the over burdening demand for skilled human resources in the areas of information technology and telecommunications. The partnership with Japan creates many needs for continued communication. USP may be able to connect to Japan using several options including J-Net, GDLN and ISDN. If the Post Partners project is resumed under another mechanism, that would also be an option for cross connection however in all of these scenarios licensing issues may be a barrier.

University of the Ryukyus

The University of the Ryukyus in Okinawa, Japan, has the most pressing need to maintain communications with these Pacific Islands institutes of higher education. The University recently established the Center for Asia Pacific Island Studies (CAPIS) to promote collaborative research in Asia and the Pacific Islands.

CAPIS has Memoranda of Agreements with the following Pacific Island educational institutions:

1. National University of Samoa
2. Atenisi University (in Tonga)
3. College of the Marshall Islands
4. College of Micronesia
5. Palau Community College
6. University of Papua New Guinea
7. University of New Caledonia
8. University of the South Pacific

In summary CAPIS:

- is interested in research exchange with Asia and Pacific Island locations that share similar regional characteristics as Okinawa;
- will promote international collaboration, academic exchange focusing on interdisciplinary approaches to island problems;
- has an objective to contribute directly to the development and measures of island development; with a focus on: environment, culture and limited island resources;
- is located in Okinawa, that is the only island prefecture in Japan and consists of 160 islands of which 39 islands are inhabited;
- has initiated programs with the South Pacific and Asian countries as there are many Okinawans that have migrated to Hawaii and the Pacific Islands; and is currently receiving students from the South Pacific;
- supports an overall objective to contribute to the island communities by providing and sharing academic findings domestically and internationally by exchanging lectures and programs;
- a department of the University of the Ryukyus that hosted two major academic summits involving leaders from the Pacific Islands initiating the establishment of relationships with these educational institutions; and
- collaborates with the JICA Okinawa International Center whom assists with the coordination of projects in Asia and the Pacific Islands.

Summary of Potential Program Areas

Follow is a summary of planned projects and potential program areas, needs and interests between Pacific Island and Japanese educational institutions that have been identified through interviews and meetings:

Facilitate and Coordinate Institutional Relationships

The SCS and PEACESAT connection can be utilized for the introduction, facilitation and coordination of institutional relationships. There are numerous organizations with access to SCS and PEACESAT. The intersection of interests and collaboration can be investigated and maintained through video teleconference services.

Center for Asia Pacific Island Studies (CAPIS), University of the Ryukyus

The SCS and PEACEASAT interconnection will assist in maintaining cooperation between CAPIS and partnering Pacific Island educational institutions. To cultivate on-going collaboration with the use of video teleconferencing, a series of video meetings is planned between the Center and its partnering educational and research institutes. The meeting purposes are twofold. One purpose is to introduce the video teleconferencing capabilities available between SCS and PEACESAT to support on-going future collaborative efforts. Secondly, to introduce the various research areas, needs and potential for collaboration.

East-West Center

The East-West Center has a Special Okinawan Projects Director and Pacific Island Development Program. The East-West Center has expressed interest in utilizing the SCS and PEACESAT connection in program development. The Special Okinawan Projects Director participated in an IP video test between the University of the Ryukyus and PEACESAT at the University of Hawaii. This demonstration assisted in explaining the potential of the network for future applications. Potential uses of the networks include upcoming international Okinawan association meetings and a conference on health and traditional healing.

NIME Study Team - University of Hawaii Introduction

The University of Hawaii Educational Technology Division of the College of Education met with a NIME study team commissioned by the Japan Ministry of Education to identify teacher training programs in distance learning. The video teleconference was first an introduction of the University of Hawaii programs. The introduction resulted in Hawaii being selected as a location to be included in the NIME study.

Palau International Coral Reef Center

The Palau International Coral Reef Center (PICRC), funded by Japan, is a world class research institute. Mr. Patrick Tellei, Chairman, PICRC Board of Directors envisions telecommunication as a means of strengthening relationships between Japan, the Republic of Palau and other areas. There are on-going joint research activities with Tokyo University, Waseda University and the University of the Ryukyus. Video teleconferencing through the SCS/PEACESAT interconnection can assist in maintaining these joint projects, disseminating information and supporting training and education.

Language Courses and Teacher Training

Japanese Language Programs

The most frequent request from Pacific Island educational institutions is for courses in Japanese language as a second language, teacher training in Japanese language and conversational practice sessions with native Japanese language speakers.

Commonwealth of the Northern Mariana Islands - Public School System

In particular the Commonwealth of the Northern Mariana Islands has one Japanese Language teacher, Ms. Adachi. In an interview by video teleconference Ms. Adachi expressed her interest in developing distance learning Japanese language courses. There is a severe need for teacher training in Japanese language.

Guam Department of Education

Similarly in Guam, according to the Guam Department of Education (GDOE) Superintendent there is a serious problem with the shortage of Japanese language teachers. Ms. Eloise Sanchez, Associate Superintendent reported that GDOE has a language requirement of four semesters for graduation. Currently there are students that have taken Japanese language for semesters one and two, however due to the lack of Japanese language teachers there are no courses scheduled for semesters three and four. This is problematic for juniors and seniors to meet their graduation requirement. Ms. Sanchez is seeking solutions in distance learning and would like to provide the GDOE students with an opportunity to obtain their language credits in the means. GDOE may also consider Japanese language teacher training to increase the available Japanese language teachers in Guam.

English Programs

Conversely in Japan, Shumei University, Akita University and Miyazaki University expressed very strong interest in English language programs. Many English language teachers in Japan agree that interactive video teleconferencing with native English speakers encourages student motivation and is important for cultural exchange as well.

Foreign Language Project - Akita University

A proposed research project entitled "Practice of and Investigation into Foreign Language Learning Aiming at Multicultural Symbiosis" was submitted for funding by researchers from Ritsuko Miyamoto; Akita University and Red Cross Junior College of Akita. The project involves the investigation of joint language learning classes between Japan, Australia and

other countries to promote and develop foreign language aiming at multicultural symbiosis by creating an international class setting by video teleconference. PEACESAT and the University of Hawaii was invited to participate in this project.

Tokai University

Dr. Fusato Taniguchi, Director, International Student Education Center, Tokai University expressed interest in using the SCS/PEACESAT link for a connection between the Tokai University Pacific Center located in Honolulu, Hawaii and Tokai University in Japan. Dr. Taniguchi is interested in using this connection for Japanese language training; providing the students at the Pacific Center an opportunity to practice speaking Japanese and to make connections with resources available at the Tokai University.

Intercultural Exchange Program

There is interest in intercultural programs between Japan, Hawaii and the Pacific Islands covering issues in intercultural business management and communications and globalization issues regarding perspectives of the digital divide and global economy. These topics may be significantly enhanced for students by the introduction of interactive dialog with other students within the region.

Phase 3 Pilot Project

The expressed interests in these areas have prompted a pilot project to be implemented in Phase 3 between the College of the Marshall Islands, Miyazaki University and the University of Hawaii - Kapiolani Community College. The next section of this report provides in more details on the scope of the project.

National University of Samoa

President and Vice Chancellor Magele has many program areas and ideas for collaboration between the National University of Samoa (NUS) and the many Universities in Japan of which NUS has Memoranda of Agreements.

However one immediate project that will be funded by the Sasakawa Pacific Islands Nation Fund is a cultural exchange between Samoa, American Samoa and Okinawa. The University of the Ryukyus was selected at the SCS site in Okinawa specifically because currently there is a visiting NUS professor and graduate student who will be able to help facilitate and participate in the program exchange from Okinawa.

Planning meetings using the SCS/PEACESAT connection have been scheduled.

K-12 Programs

Although not a directive of NIME, there are numerous requests for K-12 student exchange programs between Japan, Hawaii and the Pacific Islands. These programs are popular and always in high demand. In experimenting with IP video teleconferencing between Aoya High School, the high school teachers were free to establish numerous conferences, trial sessions as well as use the system for administrative planning meetings without feeling inhibited by telecommunication cost factors.

Aoya High School, Mid Pacific Institute, Hawaii and American Samoa Programs

During Summer 2002 Aoya High School in Tottori, Japan conducted numerous exchange programs. A one-time event was with students in American Samoa. It was a cultural exchange where the Samoan students presented a program about discovering the roots of their ancestors. The students displayed and introduced cultural artifacts handed down through generations, family lineage, traditional Samoan costume, song and dance. In return the Japanese students performed a tea ceremony and archery exhibit.

To encourage the incorporation of international exchange as part of the course curriculum rather than only one-time field trip events, the Aoya High School and Mid-Pacific Institute, a private high school in Hawaii, are currently developing projects between the Hawaii Japanese language class and students in Aoya High School. The first sessions were successful introductions to video teleconferencing. The student played 'jun ke pom' or 'paper, scissors, stone' to test effects of the video teleconferencing delay. The delay was not long enough to give an advantage or disadvantage to either location.

Section V: Phase 3 - Project Planning and Implementation

Phase 3 involves developing a general outline for the implementation of a pilot project using SCS and PEACESAT to evaluate and gain information for improved international exchanges between Japan and the Pacific Islands.

Intercultural Course Project

The College of the Marshall Islands, University of Miyazaki and the University of Hawaii - Kapiolani Community College will participate in an intercultural student exchange scheduled for Spring 2003 utilizing the SCS and PEACESAT connection.

A full course will not be delivered under this project, instead three different college courses will include an intercultural component that involves student collaboration internationally via Internet and video teleconferencing.

Learning Objectives

The project learning objective is to compare preconceived notions of cultural differences in business management, intercultural communication and delivery of education. These topics were selected as they fit within the scope of the individual courses: UH Kapiolani Community College - Introduction to Communication (Intercultural, Business and Telecommunications); College of the Marshall Islands (Business Management); and University of Miyazaki (Teacher Training in Education). The University of Miyazaki also includes English language practice as one of their student learning objectives.

Scope of Project

Depending on the number of students enrolled it is expected that each class will be divided into two groups to pair up with the other two locations. For example the Hawaii students will have one group working with the Marshallese and the second group working with the Japanese students.

The students will first develop a short survey on their topic and answer the questions as they perceive the respondents will answer. Then the students will be asked to research their topics, revise their surveys and transmit to the respondents by email. By video teleconference, the students will provide a presentation on their topics and have a question and answer period. A second video teleconference will be scheduled to discuss the perceived ideas, information learned through research and present a comparison of information received through the surveys and presentations.

All communication will be in English. The video teleconference times will be

negotiated as the course times vary. The time zone differences between the three locations are as follows:

GMT	2200 - 2330
Hawaii	12:00 Noon - 1:30 PM
Majuro	10:00 AM - 12:30 AM
Miyazaki	7:00 AM - 8:30 AM

Students and professors will be provided with a survey regarding the technical aspects of using the SCS/PEACESAT connection as well as questions about program/content, student/professor satisfaction, etc. The results of this project will be written up and submitted to various distance learning and educational journals for publication consideration.

Section VI: Conclusions and Recommendations

The SCS and PEACESAT Interconnection Project has the potential to assist with regional cooperation. Phase I of the project regarding the technical interconnection is complete, with IP selected as the first method of cross connecting and ISDN as the alternative. There are other options that can be investigated in the future especially if there is a need to incorporate Asia Pacific countries. There are numerous technical options for NIME and PEACECSAT to increase international network capacity as well as for NIME to join ultra high speed networks in Japan if required due to significant growth in operations. This report documents many of these options. There may be restrictions in terms of network applications and justification for interconnection, this and cost implications need to be studied in more detail.

Phase II regarding program development will be on-going. As outlined in the Program Development section there are several projects ready for implementation (University of the Ryukyus Seminars; National University of Samoa Cultural Exchange, Aoya High School Language and Culture Program) and others to be established (Japanese Language Teacher Training, Telehealth and other Distance Learning Programs).

A lot of progress was made during the course of this study however it was found that both networks can improve in public relations, marketing and outreach to its user groups. The project itself was a good tool for the distribution of information about the services. In some cases, there was inaccurate information and unclear understanding of the cost of SCS; therefore professors of Universities with SCS systems did not consider using the network, even at National Universities where the costs are often subsidized. Perhaps it is not the task of NIME, but the individual SCS Universities to inform staff and faculty of the available operations and services. Similarly the PEACESAT network is open for all public service sectors however many groups have never visited a PEACESAT video teleconference facility and was not aware of the capabilities available on-island. Again, the demonstrations assisted PEACESAT in marketing their services.

The implementation of the project outline developed in Phase III will provide more information on the use of SCS and PEACESAT for international exchanges between Japan, Hawaii and the Pacific Islands. The implementation of this project will also provide additional and on-going experience between the SCS and PEACESAT NOC and assist in the development of standard operating procedures between the two NOCs.

A few recommendations listed here involves the issues of distribution of information, approaches to determining appropriate applications and where the SCS/PEACESAT connection can fill existing needs for communication; and issues of establishing a framework for on-going operations technically and administratively. Finally some thoughts are offered from an outsiders perspective of NIME's potential role as a critical core network operations center in Japan for facilitating the various cross connects of different types of networks.

A summary of recommendations:

- Implement the Phase III pilot project using SCS and PEACESAT for evaluation and input for improved international exchanges between Japan, Hawaii and the Pacific Islands.

- Promote SCS/PEACESAT usage for Japan/Pacific Island collaborative activities, distance learning and course exchanges.

- Operationalize the interconnection between SCS and PEACESAT:

  - Establish a Memorandum of Agreement between NIME and the University of Hawaii in support of continued collaboration and cooperation.
  - Establish Operational Procedures: There is a need to create standard operating procedures between the two Network Operation Centers to cover scheduling reservations, guidelines for acceptable use and technical procedures.
  - Establish a management framework that includes a user fee structure.

- Consider the development of NIME's NOC as a bridge to facilitate the cross connection of various types of networks and protocols. There are many factors to deliberate. Researchers do not want to be tasked to manage an operations and therefore the NOC must be equipped with increased operations staff and equipment that will enable the transcoding of various network protocols. The NIME NOC will require a gateway and gatekeeper for the H.320 and H.323 transcoding and may consider a video teleconference multipoint conferencing unit, however if SCS is being reviewed for potential network upgrade from analog to digital services, it is recommend to incorporate the NOC upgrades at the same time to ensure compatibility of the MCU and modified SCS network scheme.

- Promote NIME as an agency of collaboration that is reflective of its network capabilities. Encourage other Japanese funded and operated regional networks to combine resources by interconnecting and sharing content, for example:

- J-NET (JICA)
- APAN (Asia Pacific Advanced Network)
- K-12 Networks
- University Hospital Networks

NIME's mission to promote and assist Japan institutes of higher education and its growing commitment in supporting collaborative projects internationally positions NIME as a critical organization for Japan as it faces issues and challenges of globalization. Japan also has many individual networks and many that extend internationally as well. NIME already has a role in managing the operations of SCS and providing coordination of 150 universities and research institutes, it seems like a natural evolution for NIME to assume the responsibility (or at least be equipped for the capability) of being a gateway in Japan for these various networks.

The SCS/PEACESAT Interconnection Project established a means for a Japan-Pacific Island connection and reviewed potential program areas and existing institutional relationships. The project also increased awareness of the unique challenges faced by neighboring Pacific Island entities highlighting many commonalities in terms of island economies, sustainability, environment and cultural preservation with the Okinawan island chain. Unlike past 'experiments' of network integration, the SCS/PEACESAT connection is expected to be operational and on-going; therefore a it is appropriate for the establishment of a Memorandum of Agreement between the two institutes.

APPENDIX

Appendix A

List of Contacts

Ms. Sachiko Adachi
Japanese Language Teacher
Public School Systems, CNMI

Mr. Hiroto Ashikaga
High School Teacher
Physics and Information Technology
Aoya High School

Mr. Tua'imalo Asamu Ah Sam
Director
Ministry of Post and Telecommunications
Samoa

Mr. Bruce Best
PEACESAT Station Manager
University of Guam

Mr. Clement Capelle
Manager
Emergency Management
Republic of the Marshall Islands

Dr. Greg Dever
Palau AHEC Director
Director, Bureau of Hospital & Clinical Services, MOH
Associate Clinical Professor of Pediatrics, JABSOM

Mr. Henry Falan
Director
Department of Education

Dr. Catherine Fulford
Professor
Department of Educational Technology
College of Education
University of Hawaii

Dr. Robert Guild
Economic Infrastructure Advisor
Pacific Islands Forum Secretariat

Mr. Joe Habuchmai
Director
Academic Programs
College of Micronesia

Ms. Rieko Hayakawa
Program Officer
Sasakawa Pacific Islands Nation Fund

Dr. Curtis Ho
Associate Professor
Department of Educational Technology
College of Education
University of Hawaii

Mr. Tadashi Ikeshiro
Director
J-Net Management Division
Japan International Cooperation Agency

Mr. Stephen Keevil
Manager
Finance and Information Technical Services
Forum Secretariat

Dr. Geoffrey Kucera
Chair and Professor
Department of Educational Technology
College of Education
University of Hawaii

Mr. Sal Poloai
IT Edtech Manager
Educational Technology Office
Department of Education

Mr. Tomiya Kiichi
Deputy Director
J-Net Management Division
Japan International Cooperation Agency

Dr. Kazunori Konishi
Secretariat Director
APAN JP Consortium

Dr. Toshio Kosuge
Professor
University of Electro-Communications

Dr. David Lassner
Chief Information Officer
University of Hawaii

Mr. Kaina Lingaton
Communication Specialist
Telecommunications and Information Policy Group

Dr. Magele Mauiliu
President and Vice Chancellor
National University of Samoa

Mr. Kozo Nagami
Staff
J-Net Management Division
Japan International Cooperation Agency

Dr. Norman H. Okamura
Principal Investigator, PEACESAT
Telecommunication Specialist
University of Hawaii

Mr. Thomas Okamura
Systems and Operations Manager
Telecommunications and Information Policy Group
University of Hawaii

Mr. Koichi Omaori
Communications Officer
The World Bank Tokyo Office

Mr. Hajime Oshiro
Professor
Center for Asia and Pacific Island Studies
University of the Ryukyus

Mr. Tsuneo Oshiro
Professor/ Director
Center for Asia and Pacific Island Studies
University of the Ryukyus

Mr. Tim Owen
IT Director
College of the Marshall Islands

Dr. Annette Sherry
Associate Professor
Department of Educational Technology
College of Education
University of Hawaii

Ms. Yasuko Shiozawa
English Professor
Shumei University

Ms. Eloise R. Sanchez
Associate Superintendent
Division of Curriculum & Instruction
Guam Department of Education

Dr. Fusato Taniguchi
Executive Director
International Student Education Center
Chair of Japanese Language Course
Tokai University

Dr. Michael Tatum
President
College of Micronesia

Mr. Patrick Tellei
President, Palau Community College
and
Chairman, Palau International Coral Reef Center Board of Directors

Dr. Kenji Saga
Japan National Committee for Pacific Economic Cooperation

Dr. Adele Satele-Galea'i
President
American Samoa Community College

Mr. Hideyuki Seki
Manager, Multimedia Service
Shonan Fujisawa Media Center
Keio University

Mr. Tsutomu Shibata
Senior Advisor and World Bank Institute
Representative for Japan

Dr. Tatsuro Shinchi
Associate Professor
Division of Information Science and Multimedia
Center for Educational Research and Practice
Miyazaki University

Mr. Lance Shinsato
Computer Specialist
Telecommunications and Information Policy Group

Dr. Irene Taafaki
Majuro Center Director
University of the South Pacific

Mr. Robert Nakasone
Director, Okinawa Special Projects
East-West Center

Ms. Larissa Savares
Special Assistant to the President
Northern Marianas College

Mr.Takeshi Yamane
Shonan-Fujisawa Information Technology Center
Keio University

Dr. Shirley Yamashita, Associate Specialist
Department of Educational Technology
College of Education
University of Hawaii

Mr. Garret Yoshimi
Telecommunication Manager
University of Hawaii

Appendix B

VTC Feedback Form

Video Teleconference Participant:

Thank you for you taking the time to complete this short feedback form. NIME and the PEACESAT Program of the University of Hawaii are working on a joint project to interconnect the Space Collaboration System and the PEACESAT Network. We are testing several different technical configurations and would appreciate your feedback regarding the conference you participated in today.

The information provided will assist in the comparison of the different technical connections as well as provide valuable information for improvements in systems and operations.

We are also seeking information on current or potential distance programs between Japan and the Pacific Islands. For more information please do not hesitate to contact me at telephone +81 (0)43-298-3271.

Kindly return the completed form (by mail, email or fax) attention to Ms. Christina Higa:

Mail:
National Institute of Multimedia Education
2-12 Wakaba, Mihama-ku, Chiba 261-0014 JAPAN

E-Mail:
chris@elele.peacesat.hawaii.edu

Fax:
+81 (0)43-298-3482

Thank you.

Sincerely,

Christina Higa
Visiting Associate researcher, NIME
Director, PEACESAT

Video Teleconference Feedback Form

Date of Video Conference: _____

Site of Participation: _____
(i.e., NIME conference room)

1. The purpose of your video teleconference:
   a. Distance Learning Course
   b. Administrative Meeting
   c. Workshop/Seminar
   d. Technical Test
   e. Other: _____ (please explain)

2. The video conference satisfied meeting objectives
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. If scored low, the main reason(s) were:
      i Technical Difficulties
      ii Participants Not Prepared
      iii Poor Meeting Facilitation
      iv Other: _____
   c. Comments (if any): _____

3. Video Quality
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

4. Audio Quality
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

5. Ease of Operation
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

6. Ease of Scheduling
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

7. Video Quality for Distance Learning Applications
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

8. Audio Quality for Distance Learning Applications
   a. (Excellent) 5 4 3 2 1 (Poor)
   b. Comments (if any): _____

9. What is your experience with Video Teleconferencing?
   a. Participated in over 10 video teleconferences
   b. Participated in less than 10 video teleconferences
   c. This my first video teleconference

10. What is your level of interest in Distance Learning Technologies?
   a. (High) 5 4 3 2 1 (Low)

11. List your potential applications of this system:

12. Please provide comments or suggestions for areas of improvement?
   (Service, Operation, Coordination, etc.?)

13. Do you currently have any projects in the Pacific Islands?
   a. No
   b. Yes, if yes please describe project:

14. Would you be interested in discussing a distance learning pilot project with a Pacific Island educational institution?
    a. No
    b. Yes, if yes please complete:
        i Name:
        ii Title:
        iii Department/Organization:
        iv Email Address:

Please return completed forms to:

HIGA Christina
Visiting Associate Researcher
National Institute of Multimedia Education
2-12 Wakaba, Mihama-ku, Chiba 261-0014 JAPAN

chris@elele.peacesat.hawaii.edu
Telephone: +81-(0)43-298-3271
Facsimile: +81-(0)43-298-3482

Thank you for your cooperation.

Appendix C

Notes on J-Net

Summary of interview with Mr. Kozo Nagami, J-Net Management Division
October 2002

The J-Net Program is managed and operated by the Japan International Cooperation Agency (JICA). JICA is Japan's primary implementing agency for international technical cooperation. The main objective of the J-Net Program is to improve the overall technical cooperation through interactive video teleconferencing, course delivery and effective follow-up and project maintenance. J-Net's start-up budget was approximately US$8-9 million, US$2 million for capital improvement of the network operations center in Tokyo and an additional US$4 million for annual operating costs. These budget figures do not include funding for the development of program content.

The J-Net network consists of Japan and the Association of Southeast Asia Nations (ASEAN) Countries[1]. As of October 2002, the network is comprised of the following locations:

1. Tokyo, Japan – JICA Training Center
2. Okinawa, Japan – JICA Training Center
3. Manila, Philippines – University of the Philippines
4. Kuala Lumpur, Malaysia – Government Employee Training Center
5. Jakarta, Indonesia – Export Training Center

There are current plans for the implementation of three additional locations at the start of 2003, they are:

1. Vientiane, Laos
2. Hanoi, Vietnam
3. Bangkok, Thailand

The JICA Training Center in Tokyo is the main hub:

- Japan Connections (2Mb leased line): JICA Headquarters in Shibuya, Tokyo (512Kbps) and the JICA Training Center in Okinawa (2Mpbs).

1. Consisting of : Indonesia, Malaysia, Singapore, the Philippines, Thailand, Brunei, Cambodia, Laos, Myanmar, and Vietnam

- Asia Pacific Connections (1.544Mbps): This connection is through leased frame relay service to various satellite centers in the Asia Pacific. The committed interface rate (CIR) is 256Kbps. There are 384Kbps links from the satellite centers to the JICA Offices located in the Philippines, Malaysia and Indonesia.

- ISDN: There are twenty-four BRI ISDN circuits for interconnection to external networks such as the World Bank's Global Development Learning Network (GDLN)

- Internet: There is a T-1 connection to the Internet from Tokyo. The Internet connection can be used for connection by other satellite centers (e.g., Laos, Vietnam and Thailand) via respective international FR loops CIR 256kbps.

The leased circuits are costly. For example a frame relay circuit with a 256Kbps committed information rate (CIR) between Tokyo and Manila is approximately US$200,000 per year (this cost includes the local loop to the JICA Center). This service is provided by KDDI, the company that won the competitive bid issued by JICA. The bid requirement for experience with local loop connections and working with the counterpart countries in the Asia Pacific eliminated many potential bidders. JICA is currently investigating more cost effective alternatives.

The original J-Net network design incorporated the use of satellite communications and earth stations. The plan was revised when JICA was faced with licensing issues. The problem originated from the fact that JICA needed to obtain ownership of the earth stations, however the receiving governments would not provide JICA with proper authorization for transmission unless the earth stations were owned by a local organization. This resulted in the implementation of leased circuits instead of leasing satellite transponders. JICA estimates however that using a satellite option during this period of the J-Net deployment would not account for cost savings yet due to the limited amount of sites, however with the increase of user sites the satellite option may be more cost effective in the long term.

J-Net will provide interactive video teleconferencing in point-to-point or multipoint mode. The JICA Training Center in Tokyo is equipped with an Accord MGC 50 bridge that is capable of H.320 and H.323 transcoding. The J-Net centers are equipped with PictureTel 900 series codecs. These codecs allows for the 'picture and content' to be easily displayed concurrently. J-Net, as many other networks, struggle with quality of service issues in using H.323 IP video teleconferencing, however all the recipient countries of J-Net are using H.323 video. A video teleconference

demonstration between Tokyo and the Philippines using IP video teleconferencing showed good video quality for training and distance learning applications.

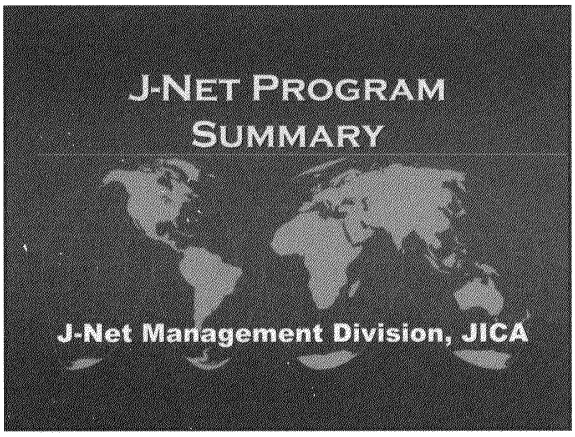
J-Net will also provide Internet access. The JICA Training Center in Tokyo has a 2Mb connection to the Internet. J-Net has both real-time and on-demand web based training platforms. The real-time web based training program used is Live Spiral. Live Spiral is a new software program developed by NTT, although it is commercially available it is not yet widespread; modifications are still underway for improvement of the system. The program is unique in that it combined live video streaming, on-line collaborating tools (i.e., text chat rooms and voice teleconferencing) along with shared applications (i.e., PowerPoint). The system is capable of simultaneously multi-casting video to multiple PC terminals and sites regardless of the limited international FR capacity (256kbps). Each training site has approximately 40-50 computer terminals.

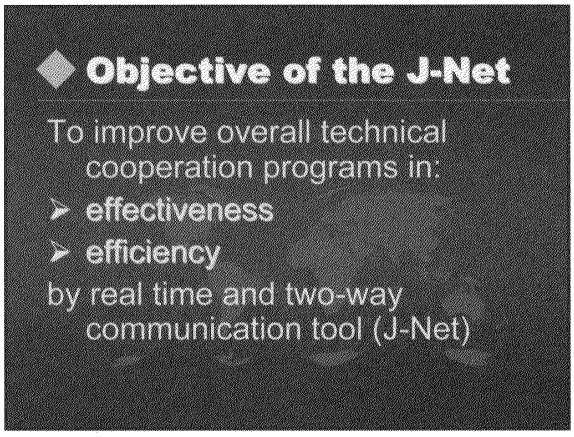
The applications of J-Net will include consultation, seminar/lectures and refresher sessions for human resources development, project monitoring and maintenance between Japan and recipient countries. This coincides with JICA's other programs that dispatch experts, Japan Overseas Cooperation Volunteers (JOCVs) and other cooperative projects.

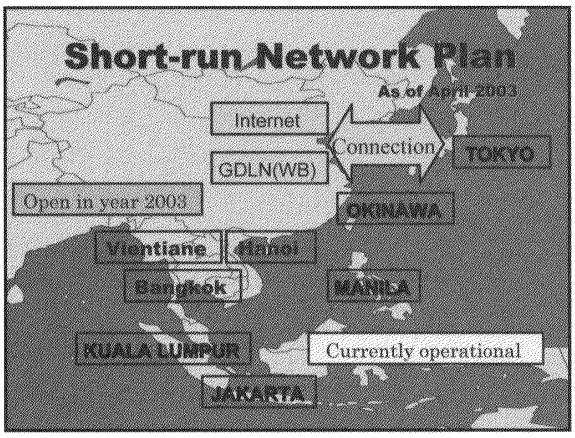
JICA recently issued an RFP for the development of content to be delivered over J-Net. Of 142 responses, JICA selected 61 of which 80% of the programs will be completed in this fiscal year. The World Bank is cooperating with JICA on one course related to monitoring and evaluation practices.

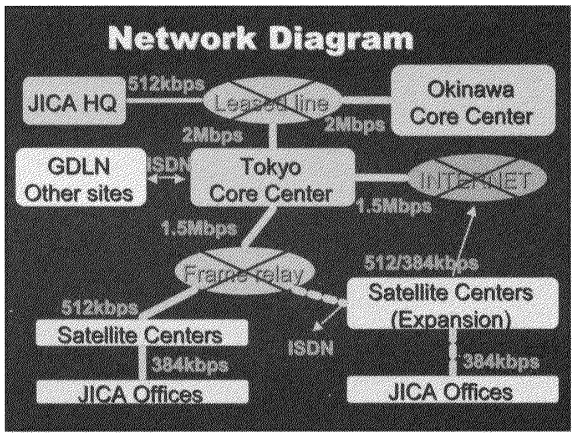
JICA's policy on J-Net usage is in development however at the time of this writing, the use of J-Net is free of charge to all JICA projects and JICA is open to permitting the use of J-Net to any non-JICA agency however the fee for this service is yet to be determined. It was emphasized that J-Net is an open network and will support interconnections to existing networks. The JICA representative in Fiji has also expressed strong interest in cross connecting the University of the South Pacific Network (USPNet) in Suva to J-Net. JICA is considering this option and will need to discuss it further with USP officials.

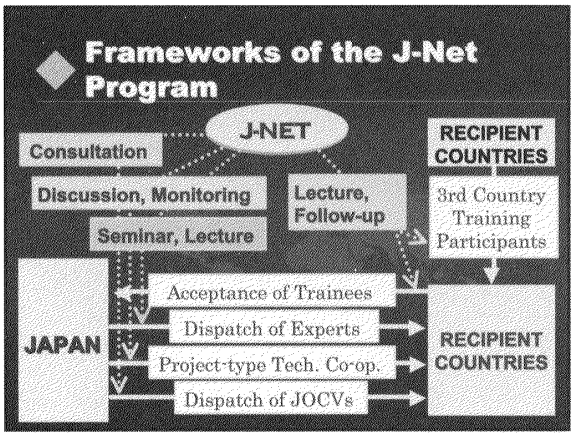
Interconnection to the Space Collaboration System could be established to J-Net with either ISDN or through H.323 IP video teleconferencing. JICA could deliver programming to the Pacific Island Partners network through PEACESAT. However it was also recommended to JICA that a Pacific Island location be considered as a JICA Center and J-Net node. Fiji and/or Samoa were discussed as potential site locations. This is currently not on JICA's agenda for deployment.

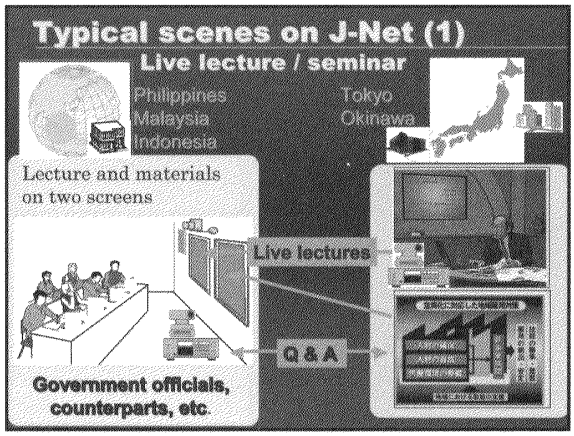

J-NET PROGRAM
SUMMARY
J-Net Management Division, JICA


Objective of the J-Net
To improve overall technical cooperation programs in:
effectiveness
efficiency
by real time and two-way communication tool (J-Net)


Short-run Network Plan
As of April 2003
Internet
Connection
TOKYO
GDLN(WB)
Open in year 2003
OKINAWA
Vientiane
Hanoi
Bangkok
MANILA
KUALA LUMPUR
Currently operational
JAKARTA

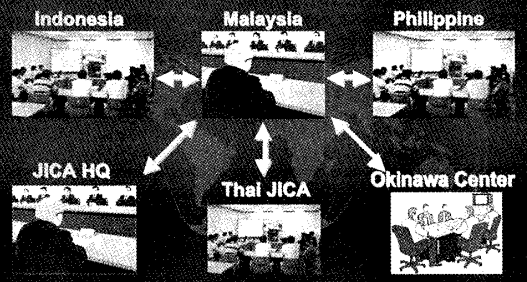

Network Diagram
JICA HQ
512kbps
Leased line
2Mbps
Okinawa Core Center
GDLN Other sites
ISDN
Tokyo Core Center
INTERNET
1.5Mbps
Frame relay
512/384kbps
Satellite Centers (Expansion)
512kbps
Satellite Centers
ISDN
384kbps
384kbps
JICA Offices
JICA Offices


Frameworks of the J-Net Program
J-NET
Consultation
Discussion, Monitoring
Seminar, Lecture
Lecture, Follow-up
RECIPIENT COUNTRIES
3rd Country Training Participants
JAPAN
Acceptance of Trainees
Dispatch of Experts
Project-type Tech. Co-op.
Dispatch of JOCVs
RECIPIENT COUNTRIES


Typical scenes on J-Net (1)
Live lecture / seminar
Philippines
Malaysia
Indonesia
Tokyo
Okinawa
Lecture and materials on two screens
Live lectures
Q & A
Government officials, counterparts, etc.

Typical scenes on J-Net (2)

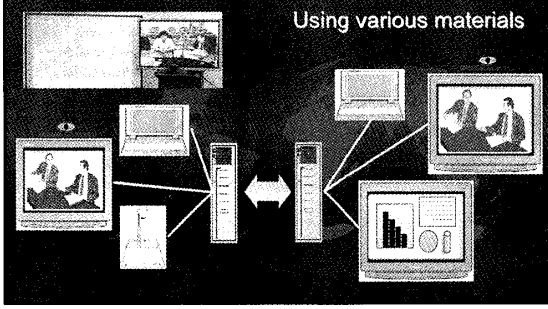
Video conference – Multi access



Typical scenes on J-Net (3)

Video conference – Point to Point access

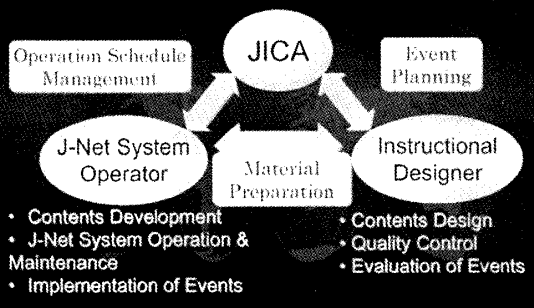
Using various materials



Video Conference Examples

- Preparation and follow-up for various programs such as experts and study missions where cordial coordination is necessary.
- Collecting program proposals from DCs.
- Counseling Overseas Cooperation Volunteers
- Temporary events such as seminars by celebrities

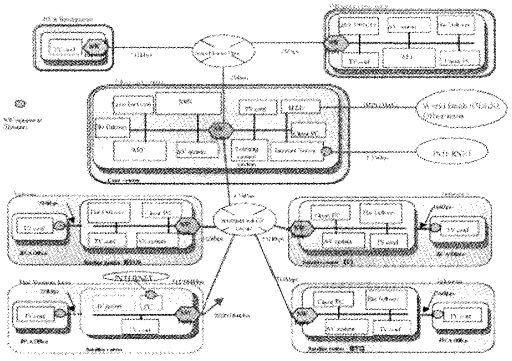
Organizational Setup for the J-Net



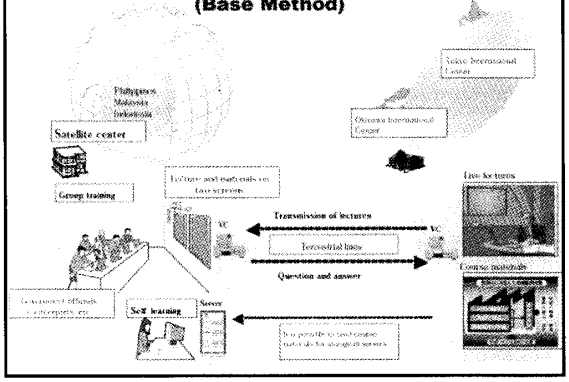
- Contents Development
- J-Net System Operation & Maintenance
- Implementation of Events

- Contents Design
- Quality Control
- Evaluation of Events

Reference: System Diagram



Reference: Conceptual Diagram of J-Net (Base Method)



Appendix D

Notes on GDLN

Summary of interview with Mr. Tsutomu Shibata,
Senior Advisor and WBI Representative for Japan
October 2002

Global Development Learning Network (GDLN) - World Bank

The Global Development Learning Network (GDLN) is an information telecommunication initiative of the World Bank. GDLN interconnects 37 centers worldwide. The major purpose of the World Bank is to focus on developmental programs working in conjunction with non-profit and non-government organizations in assisting leaders with issues of governance, health, population and trade, "to build local capacity, share learning and knowledge, and develop a global community dedicated to fighting poverty" (Global Development Learning Network [GDLN], 2002).

The World Bank institute traditionally provides face-to-face training programs for developing countries. The GDLN provides an extension of these training programs through video teleconferencing to centers in developing countries. The countries own and operate their local GDLN conferencing facilities.

In FY 2001, US$10.4 million was contributed to the development of GDLN ($3.9 million for content development and delivery, US$3.4 million for distance learning centers, US$2.2 million for management and network operations and US$0.9 million for partnership development) (GDLN, 2002). There has also been US$30 million in matching contributions from partnering agencies.

The network infrastructure utilizes three commercial satellites using VSAT earth stations to interconnect Africa, the Americas and Asia; fiber optic connections are used between Paris, Washington D.C. and Australia and ISDN is used in other locations where available.

According to the GDLN 2001 Annual Report GDLN provided 273 programs, 108,000 training days and served 20,000 participants in FY 2002/2001. The programs delivered via GDLN are free of charge and open to any country interested in participating. A program schedule can be found on the Internet at: http://wbln0018.worldbank.org/LAC/BO_OppPillar/SecCalendar.nsf/Channel%20-%20any?OpenView. The GDLN is not directly connected to universities and institutes of higher education however they have affiliations to institutes that can act as program originators.

GDLN is open to collaboration and have a partnership with JICA through the J-Net Project. The programs will cooperate in the deployment of additional centers and potentially cross connecting networks to maximize coverage. The agencies are also attempting collaboration in the area of content development; as previously mentioned GDLN and J-Net working together on the delivery of a course on consultant evaluation.

The idea of sharing content and programs with leaders in the Pacific Islands was broached. The World Bank is open to sharing programs especially if the network connection (through SCS/PEACESAT, etc.) will not increase the World Bank's overall operational cost. However emphasized was the limitation of language translation; many of the programs delivered to the Asian or Latin regions must be provided in a distinct language for the region, often not English. Another concern is the World Bank Institute's very structured distance learning format. Each World Bank employs a facilitator that assists with each distance learning program. Materials are sent in advance and reviewed. A 40-45 minute video workshop is followed by a facilitated discussion offline (to conserve costly satellite airtime) and the questions are filtered and posed to the lecturer by the facilitator. This structure was designed specifically to make most efficient and effective use of the satellite time. It was a concern of World Bank that the Pacific Islands would not have the World Bank facilitators to assist and also that the language barrier would be the most obvious obstacle. There are also minimum technical requirements and guidelines for joining GDLN.

Currently there are no GDLN centers in the Pacific Islands, however the National University of Australia in Canberra is a World Bank Center that manages the Pacific Island region. Further investigation in the possibilities of involving the Pacific Islands in receiving World Bank programming is necessary.

The World Bank is also under pressure to increase the number of GDLN centers from 37 to 100 by 2003. It was mentioned that the cross connection of GDLN to other existing networks such as SCS and PEACESAT would increase the number of locations significantly and that a GDLN center should be considered in the Pacific Islands or Hawaii where network interconnections are feasible and practical.

There are established rates for using GDLN facilities: Conference room (US$200 / hour), Internet/Multimedia Room (US$150/ hour); Video teleconference fees - set-up (US$350) and ISDN rates vary from US$2 - 10/ minute according to local telecom rates.

The GLDN official web site is: http://www.gdln.org/

Appendix E

Selected Examples
Programs Delivered Over PEACESAT

AIDS/HIV Education: session on current AIDS/HIV awareness and public health initiatives in Hawaii and US jurisdictions in the Pacific.

Asia University, University of Hawaii and the American Samoa Power Authority : an international exchange on Digital Divide issues in the Pacific Islands.

College of Micronesia Assessment Committee: representatives from Pohnpei, Chuuk, Kosrae and Phonpei of the Federated States of Micronesia participate in on-going college assessment meetings.

College of Tropical Agriculture: US Department of Agriculture outreach sessions, seeking to expand program outreach to other South Pacific Islands that may participate via video through the University of the South Pacific Network (USPNet).

Computer ACE (Actual Community Empowerment): a computer based tutoring package that assists first and second graders with reading disabilities. Tutors from the community assist training and monitoring student progress. University of Hawaii at Manoa and College of Micronesia, FSM project administrators and staff meet on a regular basis to review program status.

General Practitioner Courses: GenPrac 702: *Philosophy of General Practice & GenPac 703: Consultation and Communications* conducted between University of Auckland Faculty of Medicine and Health Sciences (FMHS), the Palau AHEC (at the Palau Ministry of Education Training Room), and the Yap State Department of Education Computer Lab.

Hawaii Association for Language Teachers: video teleconference with students and teachers in American Samoa, Oahu, Kauai and Japan. The conference touched on the use of educational technology for enhancing learning experiences. Future topics include language maintenance programs specifically designed for students that have a need to use and practice their first language.

Institute for Telemedicine and Telehealth: provides organizational updates, educational programs and workshops with content developed locally and nationally.

Nursing Course (Nursing 665): the University of Hawaii Department of Nursing delivers courses to students in Guam and American Samoa.

Pacific Islands Association of Libraries and Archives (PIALA): PIALA a regional organization, meets to discuss various topics from new collections to information communication technology issues in the region.

Pacific Resources for Education and Learning: hosts on-going video teleconferences for program administration and teacher training. PREL has also used the video teleconference to conduct job interviews.

Papa Ola Lokai held a "Pacific Diabetes Today" : seminar on public health marketing strategies for Pacific Islanders. Participants attended the Pacific Diabetes Today Resource Center's community planning workshops; the video teleconference was utilized as follow-up to these face-to-face sessions.

Shriners Hospital for Children: Guam Memorial Hospital together with other hospitals throughout the Pacific hold video teleconference consultations between patients and doctors at the Shriners Hospital for Children in Honolulu.

Special Education - San Diego State University: session includes Chuuk, Kosrae and Pohnpei to review the SDSU special education programs (i.e., Special Education Teachers Training Initiative) and other distance learning courses.

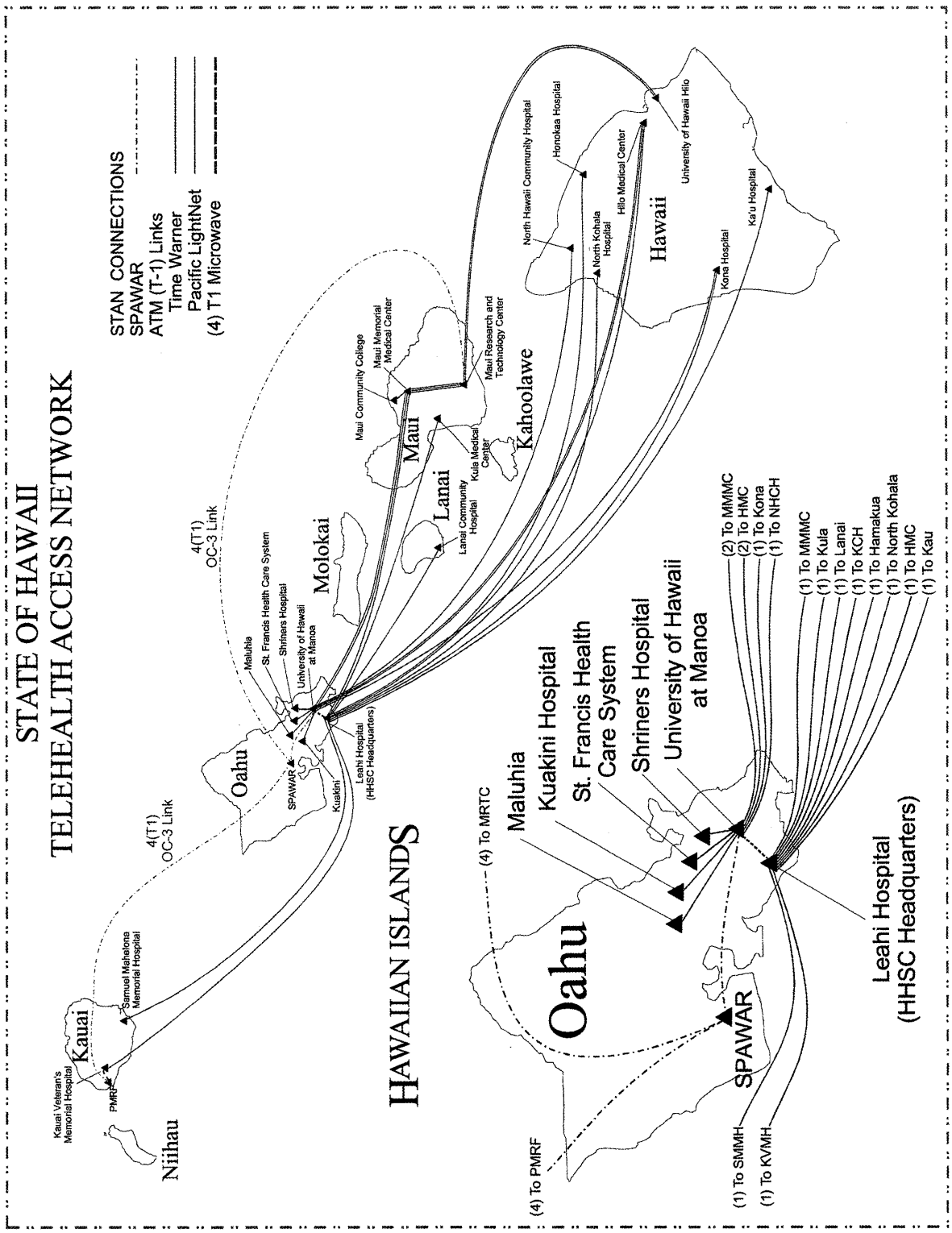
University of Hawaii Affiliated Program: weekend classes in American Sign Language to deaf children and their parents in American Samoa. The University Affiliated Program is seeking potential expansion to other areas in the Pacific.

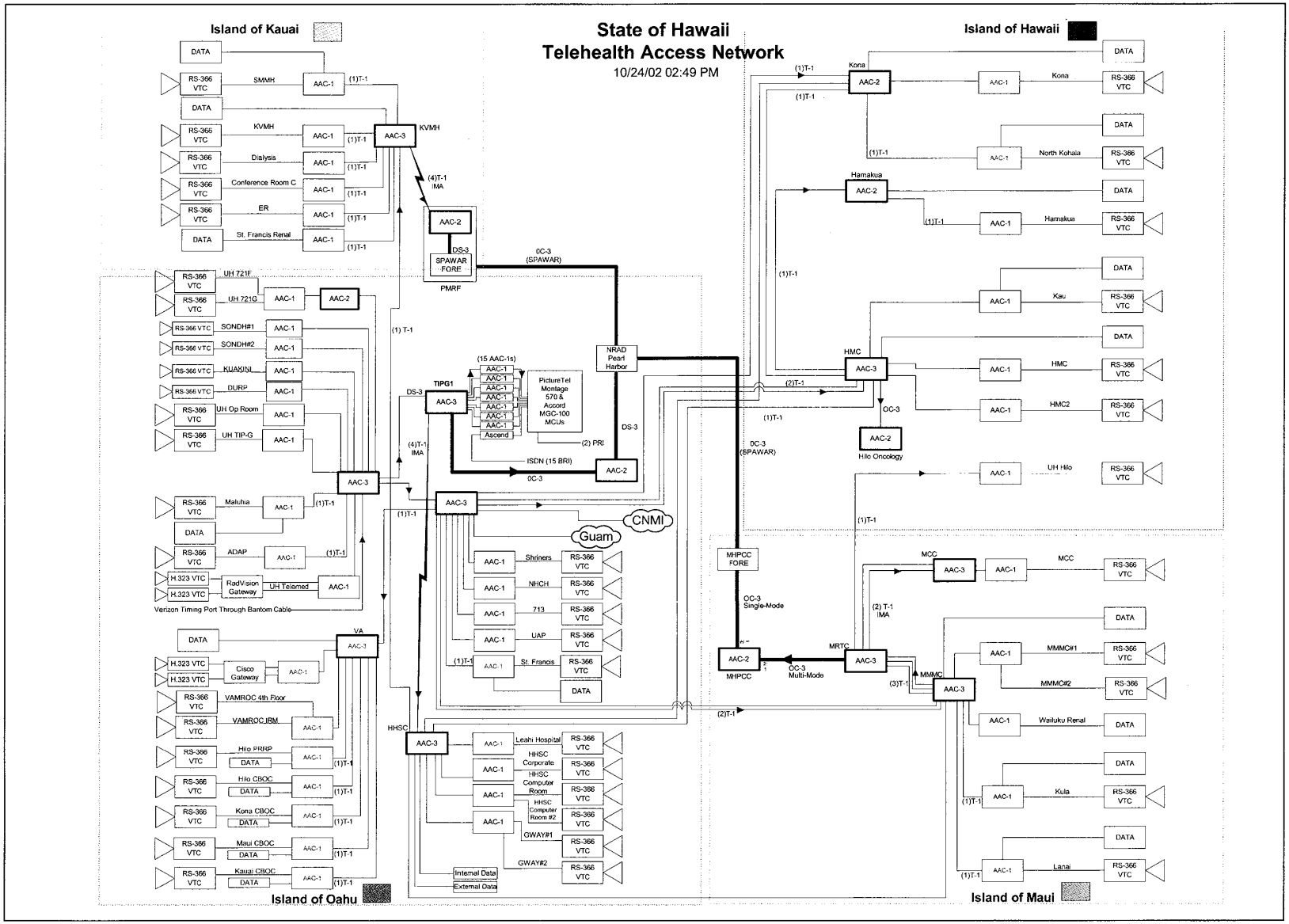
University of Hawaii Telemedicine Program: weekly grand round sessions. Initial outreach was within Hawaii the program and is now extended to the Pacific Islands through PEACESAT. Physicians in Guam and other Pacific Island locations participate in these grand round sessions.

Wastewater Treatment Plant Operator Training: project management and training sessions are held by the American Samoa Power Authority who received a grant from the US Department of Interior to provide wastewater treatment training in Palau.

Appendix F

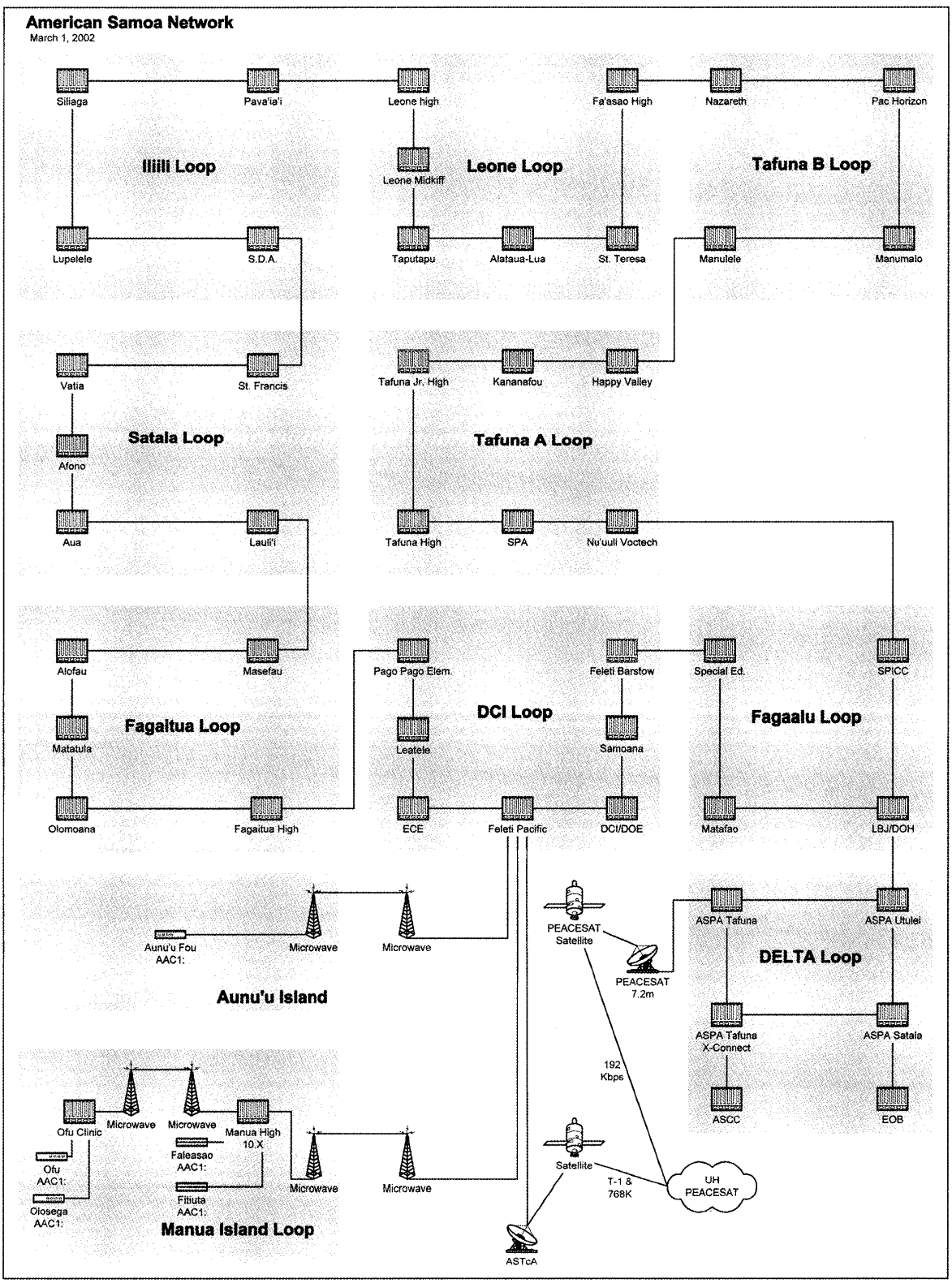
State Telehealth Access Network




State of Hawaii
Telehealth Access Network
10/24/02 02:49 PM
Island of Kauai
Island of Oahu
Island of Hawaii
Island of Maui
DATA
RS-366 VTC
AAC-1
AAC-2
AAC-3
SMMH
KVMH
Dialysis
Conference Room C
ER
St. Francis Renal
(1)T-1
(4)T-1 IMA
DS-3
SPAWAR FORE
PMRF
0C-3 (SPAWAR)
UH 721F
UH 721G
SONDH#1
SONDH#2
KUAKINI
DURP
UH Op Room
UH TIP-G
(1) T-1
TIPG1
(15 AAC-1s)
PictureTel Montage 570 & Accord MGC-100 MCUs
(2) PRI
Ascend
NRAD Pearl Harbor
ISDN (15 BRI)
0C-3
DS-3
CNMI
Guam
Maluhia
ADAP
RadVision Gateway
UH Telemed
H.323 VTC
Verizon Timing Port Through Bantom Cable
VA
Cisco Gateway
VAMROC 4th Floor
VAMROC IBM
Hilo PRRP
Hilo CBOC
Kona CBOC
Maui CBOC
Kauai CBOC
HHSC
Shriners
NHCH
713
UAP
St. Francis
Leahi Hospital
HHSC Corporate
HHSC Computer Room
HHSC Computer Room #2
GWAY#1
GWAY#2
Internal Data
External Data
MHPCC FORE
MHPCC
OC-3 Single-Mode
OC-3 Multi-Mode
(2) T-1 IMA
MRTC
MMMC
MCC
Kona
North Kohala
Hamakua
Kau
HMC
HMC2
Hilo Oncology
UH Hilo
MMMC#1
MMMC#2
Wailuku Renal
Kula
Lanai

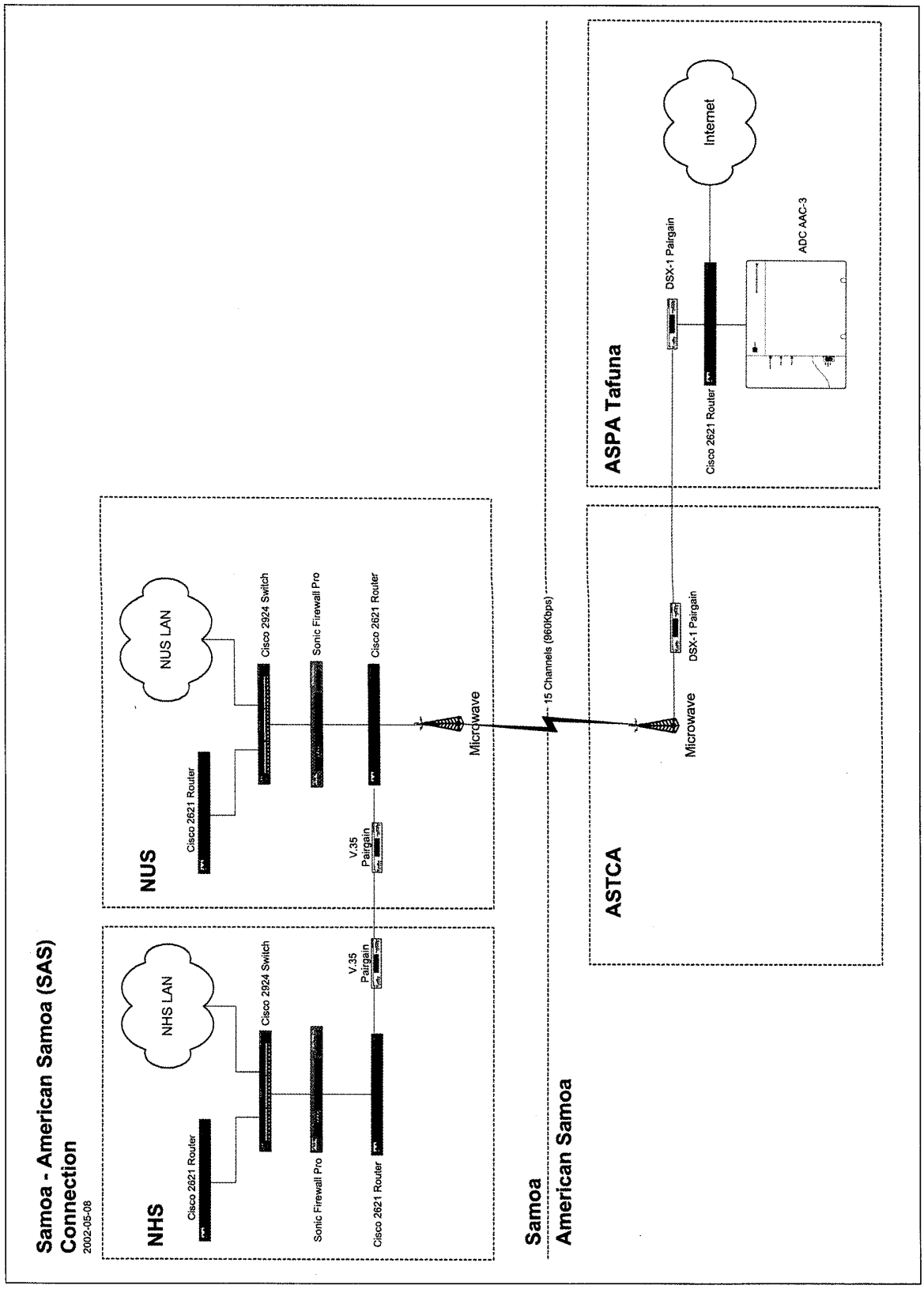
Appendix G

American Samoa DELTA and E-Rate Networks



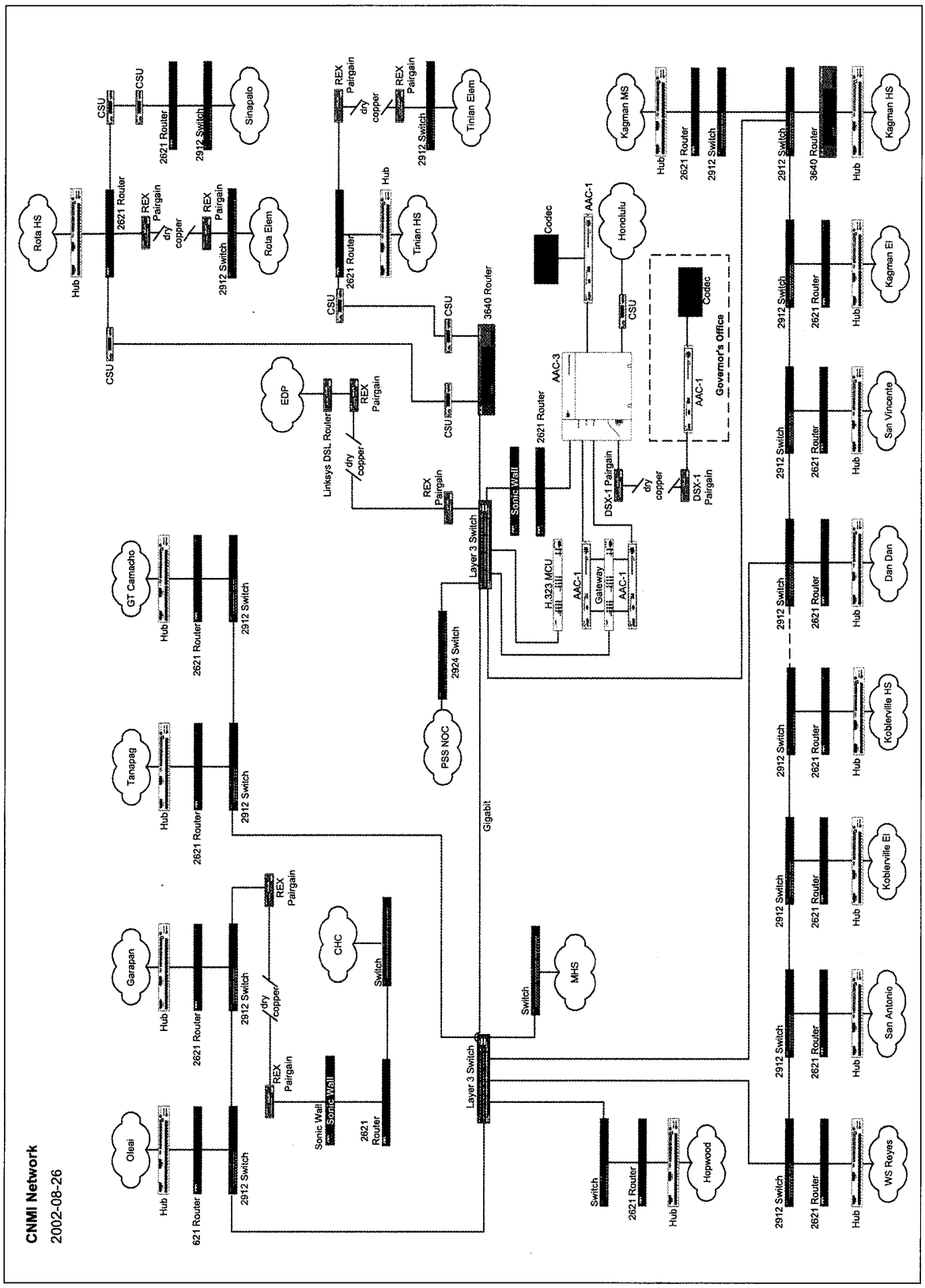
Appendix H

Samoa-American Samoa Link



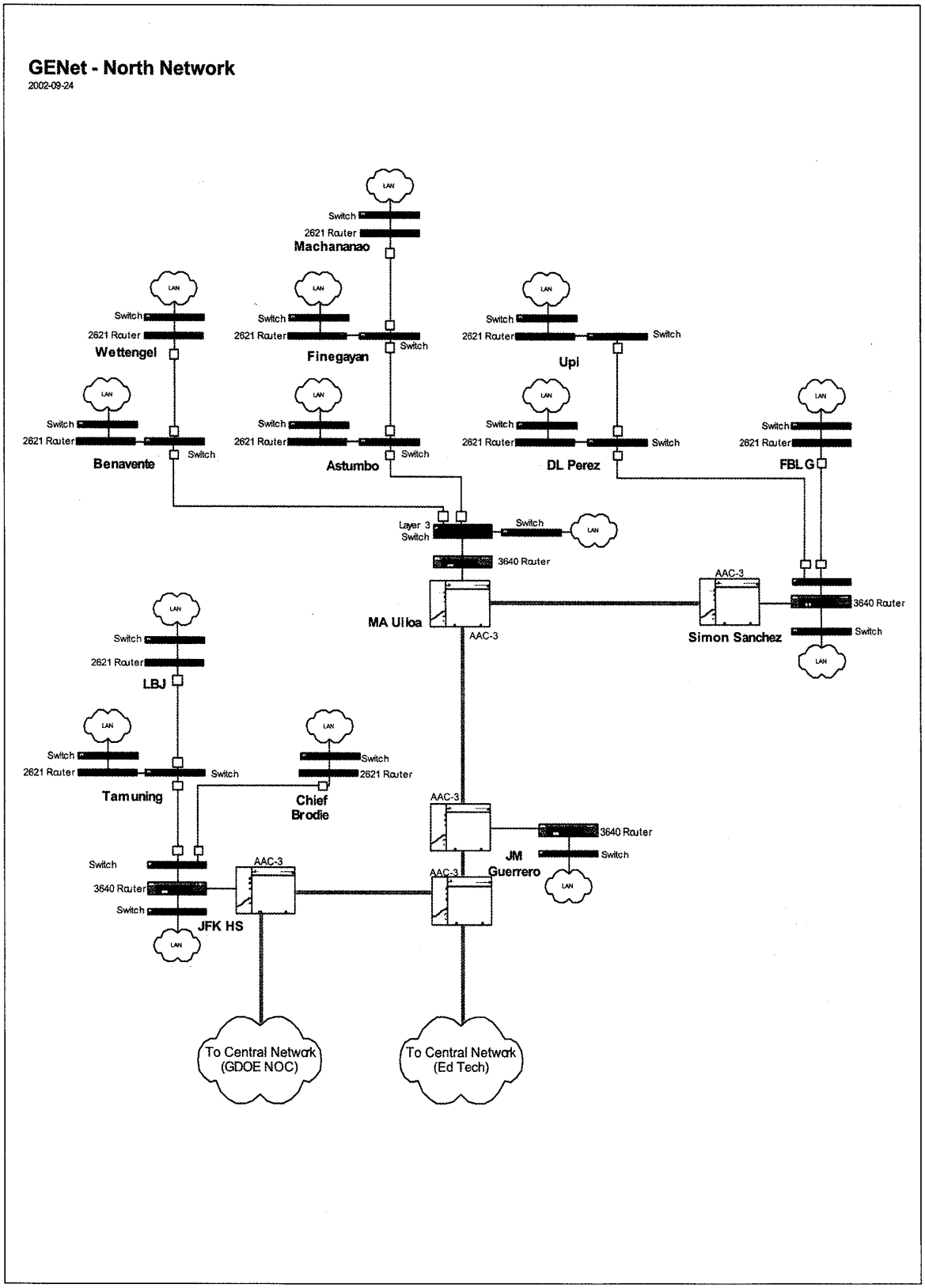
Appendix I

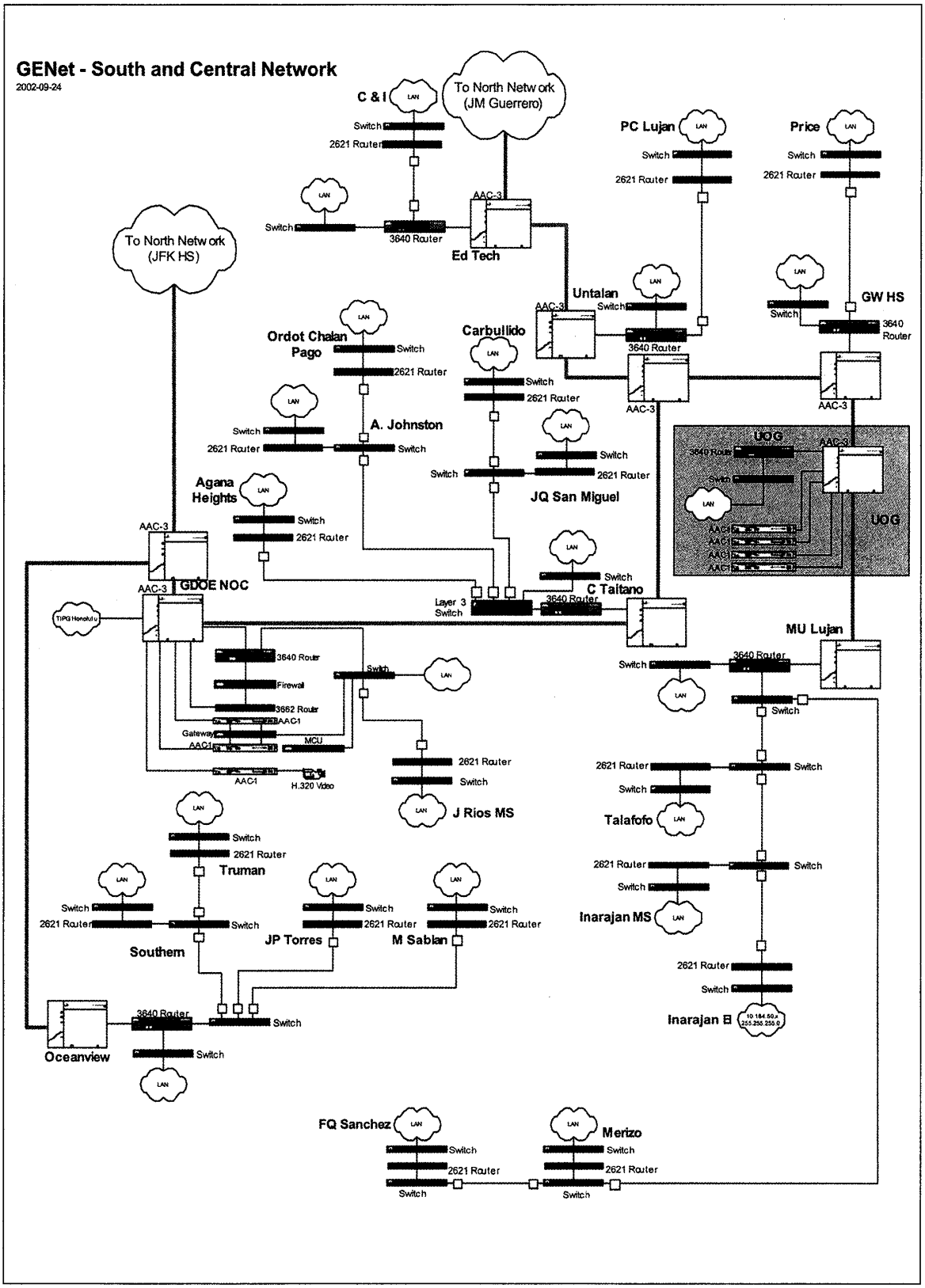
CNMI Partners in Distance Learning Network



Appendix J

Guam Educational Network




GENet - South and Central Network
2002-09-24
C & I
To North Network (JM Guerrero)
PC Lujan
Price
To North Network (JFK HS)
Ed Tech
Untalan
GW HS
Ordot Chalan Pago
Carbullido
A. Johnston
JQ San Miguel
UOG
Agana Heights
GDOE NOC
C Taitano
MU Lujan
J Rios MS
Talafofo
Truman
Southern
JP Torres
M Sablan
Inarajan MS
Inarajan El
Oceanview
FQ Sanchez
Merizo
LAN
Switch
2621 Router
3640 Router
AAC-3
Firewall
3662 Router
Gateway
MCU
H.320 Video
Layer 3 Switch

Appendix K

Summary of High Bandwidth Networks in Japan:

APAN (Asia-Pacific Advanced Network Consortium)

Source: http://www.apan.net

APAN

APAN is a non-profit international consortium established on 3 June 1997. APAN is intended to be a high-performance network for research and development on advanced applications and services. APAN provides advanced networking environment for research communities, and promotes international collaboration.

To lead the state of the Asia-Pacific research community, APAN is expanding and promoting the collaborative research efforts worldwide with renowned research institutes.

Organization

APAN Committee Chair Kilnam Chon/KAIST
Deputy Chair Jianping Wu/Tsinghwa University
APAN Secretariat Director Yong Jin Park/Hanyang University
Network Operation Center Director Kazunori Konishi/KDD
Network Engineering Director Kazunori Konishi/KDD
User Community Area Chair Markus Buchhorn/ACsys
Deputy Chair Tan Hock Soon/TP
Technology Area Chair Bu-Sung Lee, Francis/NTU
Deputy Chair Sureswaran Ramadass/USM
Natural Resource Area Director Seishi Ninomiya/NARC
Deputy Chair Shinichi Sobue/NASDA
Shoba Ranganathan/NUS

Members

Primary Members

Australia: ACSys
China : CERNET
Japan: APAN-JP Consortium
APII/CRL
IMNet/JST
KDD
MAFFIN/MAFF

RWCP/ETL
SINET/NACSIS
AI3/WIDE
Korea: APAN-KR Consortium
APII/MIC
KT
Pubnet/NCA
Malaysia: TEMAN
Singapore: SINGAREN

Associate Member
USA: CGIAR
Indiana University (Internet 2)
Thailand : NECTEC

Affiliate Member
CGIAR

Liaison Members
Canada : CANARIE (CA*net2)
Europe : DANTE

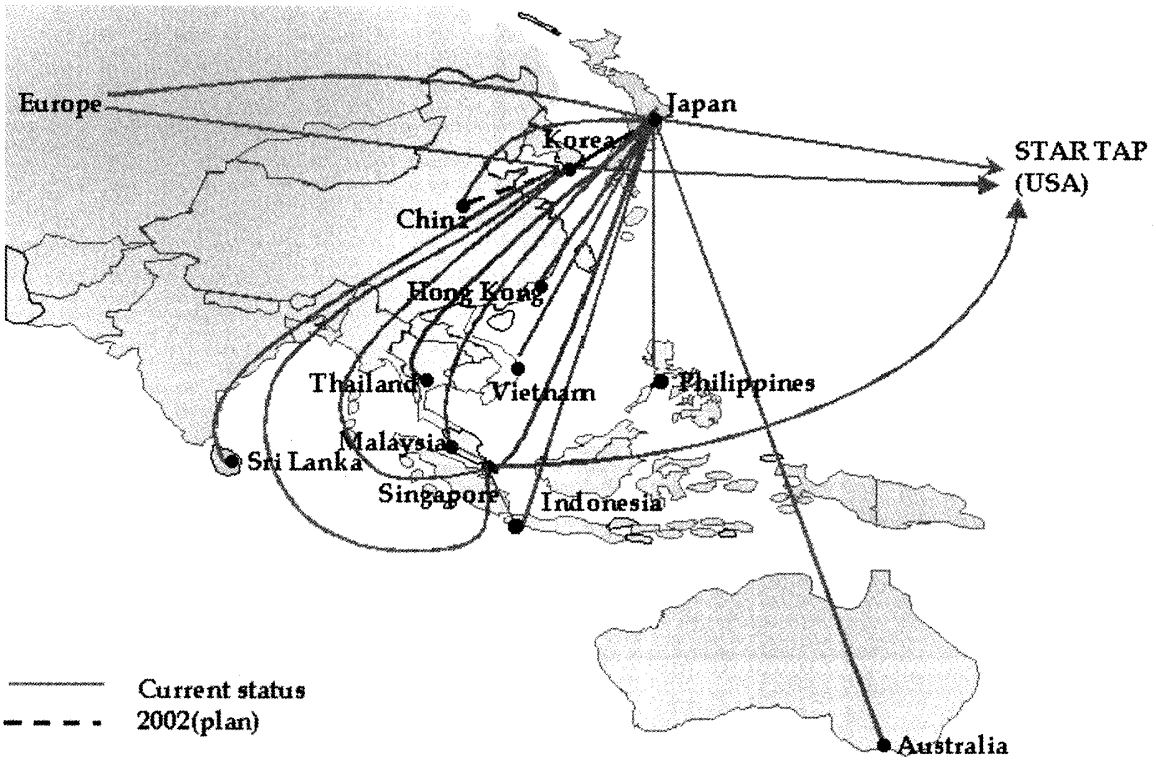
(Last updated: 2001. 11.18)
There are two classes of members in addition to liaison members. Membership of the APAN is open to any individuals, organizations, national bodies, or international bodies. Primary members are the link owners, and others are Associate members.

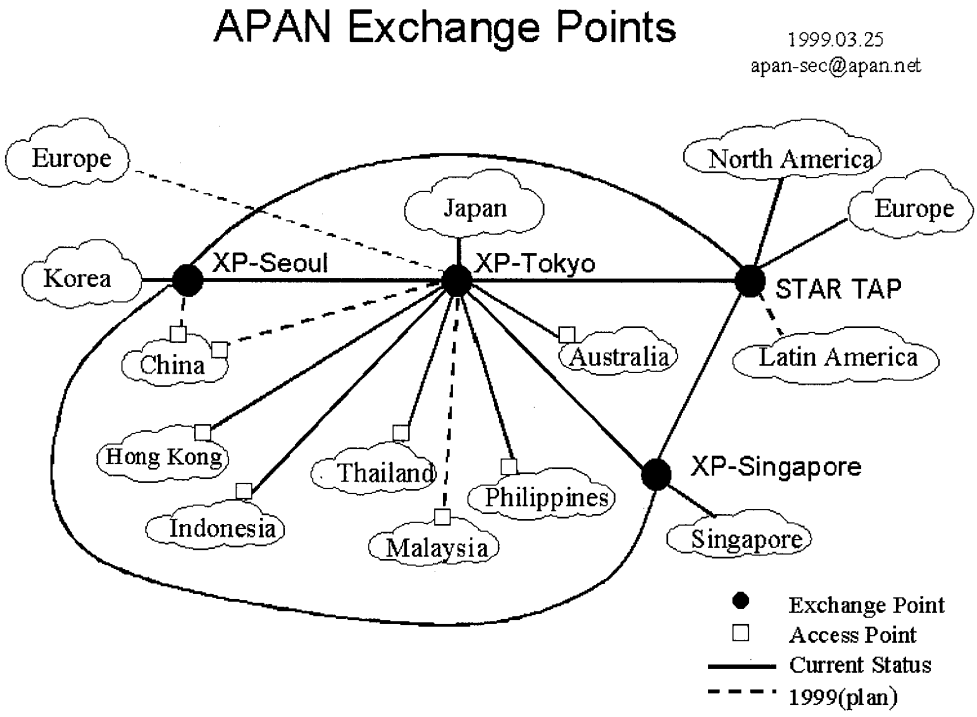
Australia, China, Japan, Korea, Malaysia and Singapore are the founding Primary members. Check our home page for further information.

Contact:
APAN Secretariat
http://www.apan.net
e-mail: info@apan.net
Yoshinori Kitatsuji/Japan Seungmi Ryu/Korea
apan-sec@lab.kdd.co.jp sec@apan.net
tel: 81 492 78 7362~3 tel: 82 42 869 3554
Francis Lee/Singapore Markus Buchhorn/Australia
ebslee@ntu.edu.sg Markus.Buchhorn@anu.edu.au
tel: 65 770 5371 tel: 61 6 279 8810
Jie An/China K.Ettikan/Malaysia

anjie@cernet.edu.cn ettikan@nttmsc.com.my
tel: 86 10 62784049 tel: 60 3 83112000

Asia Pacific Advanced Network Topology





IMnet
Inter-Ministry Research Information network (IMnet)

Source: http://imnet.jst.go.jp/en/aup.html

OBJECTIVE:

1. These AUPs show the matters to be observed by the organizations using INTER-MINISTRY RESEARCH INFORMATION NETWORK (IMnet), in order to have these organizations understood the purpose of IMnet and to promote use of IMnet meeting its purpose.

INTER-MINISTRY RESEARCH INFORMATION NETWORK:

2. IMnet promotes the distribution research information among national or public research institutes, public corporations, and cooperated research organizations. For these organizations, IMnet fosters common environment for research information and international distribution of the information.

MANAGEMENT:

3. Japan Science and Technology Corporation (JST) manages IMnet.

OBJECTIVE OF USE:

4. IMnet is used for research or support for research.
   Its profit-making use is prohibited.

CONNECTED ORGANIZATIONS:

5. The organizations which can be connected directly to IMnet are following;
   (1) National or public research institutes, public corporations, and the ministries' networks
   (2) National organizations which deal with research information
   (3) (deleted)
   (4) Following organizations which are accepted by JST

      (a) The research organizations which collaborate with or are contracted by the above-mentioned organizations (1)

(b) Public research institutes or organizations
(like industry-government-university co-research groups, semi-public corporations, etc.)

COOPERATION TO MANAGEMENT:

6. The connected organizations should observe these policies and the other matters JST decides, and should cooperate to management of IMnet.

USING OTHER NETWORKS:

7. The connected organizations which access to the other networks through IMnet should also observe the network's AUP.

DATA TRANSIT:

8. (deleted)

MANAGING COSTS:

9. The costs for maintenance and management of the common part of IMnet are borne by JST. Each connected organizations bears costs for their connection to IMnet.

These policies have been enforced since the February 24th, 1997, and applied since the January 1st, 1997.

Interconnection Policy (Draft)

This draft is showing the policy of IMnet operation, and it does not limit other network's regulation or policy.

There is a case that the draft will be changed without any preliminary announcement.

1. Interconnection with IMnet

IMnet connect with "autonomously operating network" for research information. It is not based on the physical connection method.

2. Condition of interconnection network

Interconnection network should have World Wide Reachable line or connect other Via network (s) for international traffic.

Interconnection network cannot connect with commercial networks through IMnet.

Individual condition will be discussed separately.

Inter-Ministry Research Information network (IMnet) Members

Members of IMnet (Tokyo NOC)

Last updated on 02/05/2001 10:34:27 (GMT)

- Cabinet Office
  Economic and Social Research Institute

- National Police Agency
  National Research Institute of Police Science

- Ministry of Public Management, Home Affairs, Posts and Telecommunications
  National Research Institute of Fire and Disaster, Fire and Disaster Management Agency
  Communications Research Laboratory

- Ministry of Education, Culture, Sports, Science and Technology
  Ministry of Education, Culture, Sports, Science and Technology
  National Institute of Science and Technology Policy (NISTEP)
  National Research Institute for Metals (NRIM)
  National Aerospace Laboratory
  National Institute of Radiological Sciences (NIRS)

- Ministry of Health, Labour and Welfare
  AIDS Clinical Center
  National Institute of Health Sciences (NIHS)
  National Institute of Infectous Diseases
  National Cancer Center(NCC)
  National Institute of Public Health
  International Medical Center of Japan
  National Children's Medical Research Center, National Children's Hospital
  National Institute of Population and Social Security Research
  National Institute of Neuroscience (NCNP)
  National Institute of Mental Health (NIMH)
  National Institute of Industrial Safety
  National Institute of Industrial Health (NIIH)

- Ministry of Economy, Trade and Industry
  National Institute of Technology and Evaluation (NITE)

- Ministry of Land, Infrastructure and Transport
  Traffic Safety and Nuisance Research Institute
  Ship Research Institute (SRI)
  Electronic Navigation Research Institute (ENRI)
  Tokyo Air Traffic Control Center

- (Local governments)
  Tokyo Metropolitan Research Laboratory of Public Health
  Chiba Cancer Center Research Institute

- (Government corporations, Public organizations and foundations)
  Japan Marine Science and Technology Center (JAMSTEC)
  Japan Science and Technology Corporation (JST)
  Japan Consumer Information Center
  Telecomunications Advancement Organization of Japan, Hongo Research Center
  Japan Atomic Energy Research Institute (JAERI)
  The Japan Institute of Labour
  The Institute of Physical and Chemical Research (RIKEN)
  Nuclear Material Control Center
  Kazusa DNA Research Institute
  Japanese Foundation for Cancer Research
  Research Organization for Information Science & Technology (RIST)
  Association for the Development of Earthquake Prediction(ADEP)
  Central Research Institute of Electric Power Industry (CRIEPI)
  Tokyo Metropolitan Health Promotion Center
  Tokyo Institute of Psychiatry (TIP)
  The Tokyo Metropolitan Institute of Medical Science
  Tokyo Metoropolitan Institute of Gerontology (TMIG)
  JSF (Japan Science Foundation)
  Japan Weather Association
  The Institute of Cetacean Research
  Japanese Society for Rehabilitation of Disabled Person (JSRD)
  Remote Sensing Technology Center of Japan (RESTEC)
  Earth Science & Technology Organization (ESTO)
  Government Data Research Center of Japan
  The Society of Non-Traditional Technology
  Institute for Monetary and Economic Studies, Bank of Japan
  Research Association for Chemistry, Biology and Informatics
  Waseda University

- (Private enterprise)
  Allide Engineering Corporation
  Information Sharing Platform Laboratories, Nippon Telegraph and Telephone Corporation
  MRI, Mitshubishi Research Institute, Inc.

- (Peering Networks)
  APAN, ITRC, JOIN, Kreonet, RWCP, SINET, WIDE

Members of IMnet (Tsukuba NOC)

Last updated on 01/18/2001 16:09:05 (GMT)

- Ministry of Education, Culture, Sports, Sience and Technology
  National Research Institute for Metals(NRIM)
  Tsukuba Center for Institutes
  National Research Institute for Earth Science and Disaster Prevention (NIED)
  National Institute for Research in Inorganic Materials

- Ministry of Health, Labour and Welfare
  National Institute of Health Sciences (NIHS)

- Ministry of Agriculture, Forestry and Fisheries
  Ministry of Agriculture, Forestry and Fisheries Research Network (MAFFIN)

- Ministry of Economy, Trade and Industry
  National Institute of Advanced Industrial Science and Technology (AIST)
  National Institute of Bioscience and Human Technology
  Electrotechnical Labratory (ETL)

- Ministry of Land, Infrastructure and Transport
  Meteorological Research Institute,Japan, Meteorological Agency
  Kakioka Magnetic Observatory, Meteorological Agency
  Building Research Institute (BRI)
  Geographical Survey Institute
  Public Works Research Institute (MOC)

- Ministry of the Environment
  National Institute for Environmental Studies (NIES)

- (Government corporations, Public organizations and foudations)
  National Space Development Agency of Japan
  Japan Science and Technology Corporation (JST)
  Japan Nuclear Cycle Development Institute (JNC)
  Japan Atomic Energy Research Institute (JAERI)
  The Institute of Physical and Chemical Research (RIKEN) Tsukuba Life Science Center
  Joint Research Center for Atom Technology (JRCAT)
  Tsukuba Center Inc. (TCI)

- (Peering Networks)
  KEK

Members of IMnet (Osaka NOC)

Last updated on 12/28/2000 10:11:49 (GMT)

- Ministry of Public Management, Home Affairs, Posts and Telecommunications
  Communications Research Laboratory

- Ministry of Finance
  National Research Institute of Brewing, National Tax Administration Agency

- Ministry of Education, Culture, Sports, Sience and Technology
  National Institute for Research in Inorganic Materials

- Ministry of Health, Labour and Welfare
  National Institute of Health Sciences (NIHS)
  National Cardiovascular Center

- (Local governments)
  Osaka Municipal Technical Research Institute
  Osaka Museum of Natural History

- (Government corporations, Public organizations and foudations)
  Japan Atomic Energy Research Institute (JAERI)
  Japan Science and Technology Corporation (JST)
  Institute of Physical and Chemical Research (RIKEN)
  Laboratories of Image Information Science and Technology
  Osaka Science & Technology Center (OSTEC)

Osaka Bioscience Institute
Japan Synchrotron Radiation Research Institute
Urban Disaster Research Institute Asian Disaster Reduction Center (ADRC)
Institute for Laser Technology
United Nations Centre for Regional Development

- (Private enterprise)
  Keihanna Interaction Plaza INC.
  Biomolecular Engineering Research Institute (BERI)

- (Peering Networks)
  WIDE, SINET

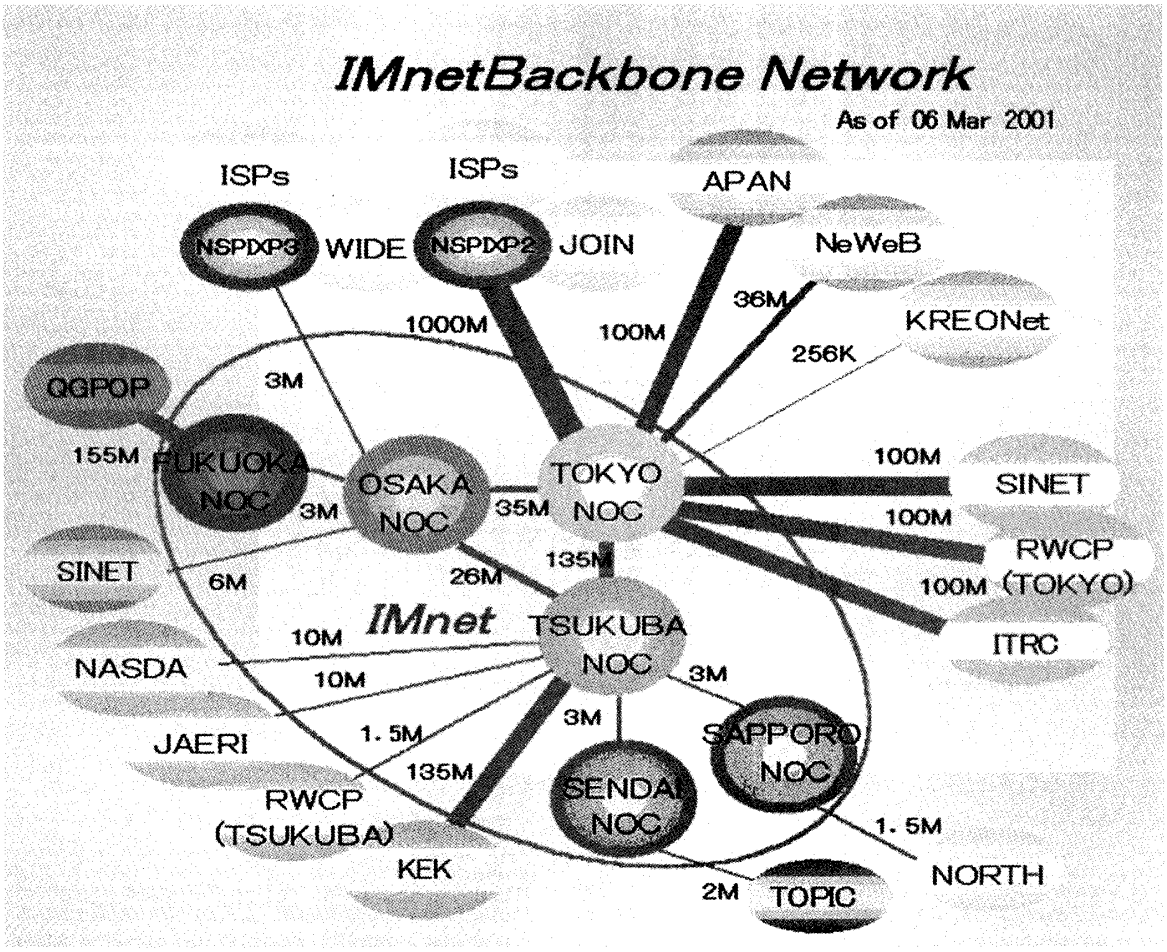
Members of IMnet (Sappro NOC)
Last updated on 02/15/2000 15:38:14 (GMT)

- (Peering Networks)
  NORTH

Members of IMnet (Sappro NOC)
Last updated on 01/29/2001 13:22:08 (GMT)

- Ministry of Economy, Trade and Industry
  Tohoku Regional Office, National Institute of Technology and Evaluation (NITE)

- (Peering Networks)
  TOPIC


IMnetBackbone Network
As of 06 Mar 2001
ISPs
ISPs
APAN
NSPIXP3
WIDE
NSPIXP2
JOIN
NeWeB
36M
1000M
100M
KREONet
256K
3M
QGPOP
155M
FUKUOKA NOC
OSAKA NOC
TOKYO NOC
100M
SINET
3M
35M
100M
RWCP (TOKYO)
SINET
6M
26M
135M
100M
IMnet
TSUKUBA NOC
ITRC
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NASDA
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1.5M
JAERI
SAPPORO NOC
135M
SENDAI NOC
RWCP (TSUKUBA)
1.5M
KEK
NORTH
2M
TOPIC

Science Information Network - SINET

Source: http://www.sinet.jp/index-e.html

English/*Japanese*
[last update: 2001.07]

SINET

In order to promote the distribution of informatics research and scholarly information among researchers at universities and research institutes throughout Japan, NII operates the Science Information Network. Its purpose is to interconnect the LANs etc., to which the researchers' terminals are connected.

The network consists of nodes (i.e., ATM switches or IP routers) located throughout Japan, which are interconnected using high-speed digital links.

Thus they form an information communication network dedicated to academic research works.

The Information Retrieval Service (NACSIS-IR) and Electronic Library Service (NACSIS-ELS) provided to researchers by NII are also implemented via the Science Information Network.

The Science Informaiton Network is also linked to the networks in the U.S.A., U.K. and other countries in order to promote international exchange of information.

To promote the exchange of research information among the industry, goverment and academic sectors, the Science Information Network is also connected to the Inter-Ministry Research Information network (IMnet) and networks operated by private sectors.

LINK MAP

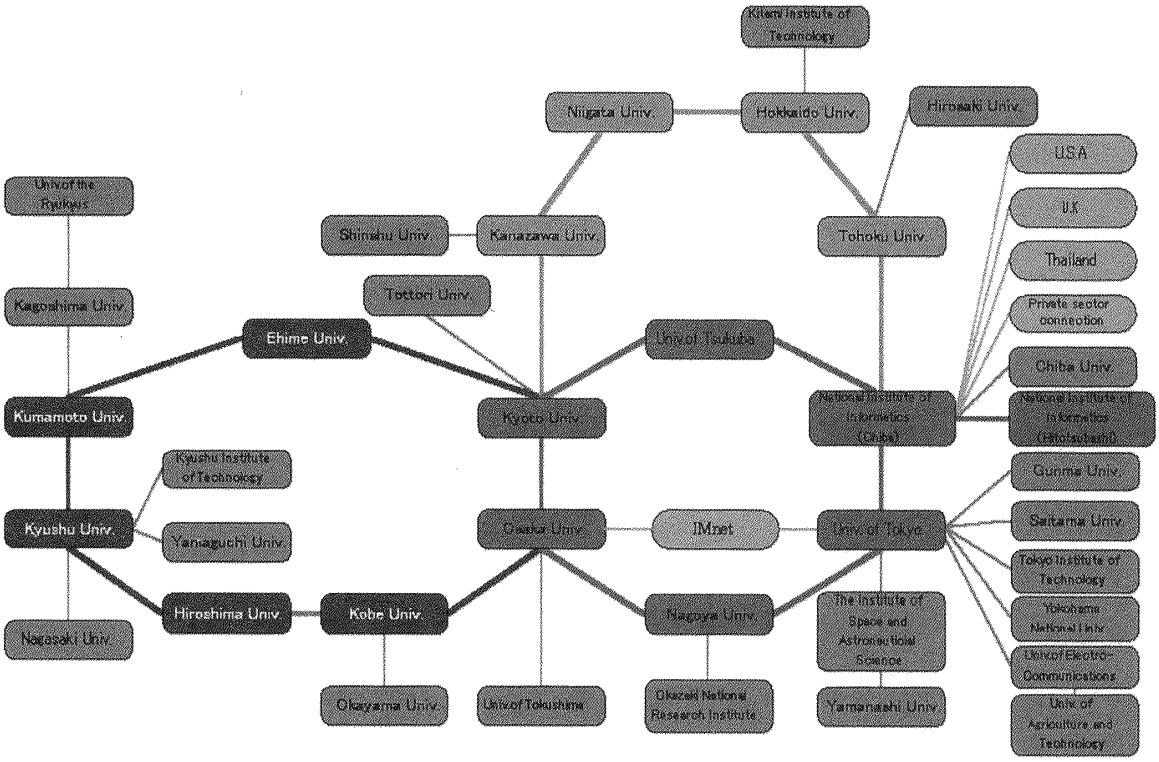
Topics

SINET-ThaiSarn Communication Link ('95.10)
New connection line with the U.K. was opened ('96.11)
Communication line with U.S.A. was upgraded to 45Mbps ('97.10)
Communication line with U.S.A. was upgraded to 150Mbps ('98.10)
Communication line with U.S.A. was upgraded to 300Mbps ('99.10)
Communication line with U.S.A. was upgraded to 500Mbps ('00.10)

ipnoc@sinet.ad.jp

(Current as of April 2001)

Science Information Network
Internal Infrastructure



Widely Integrated Distributed Environment -WIDE

Source: http://www.wide.ad.jp/index.html

WIDE PROJECT

Simply put, our research goal is "to establish large-scale distributed computing environment". WIDE stands for "Widely Integrated Distributed Environment". We are working for providing the wide area communication infrastructure with our telecommunication technology and operating system technology, and trying hard to contribute to the people.

Relationship with other research entities

On the internet, it is important to cooperate with the interconnected networks and their management entities. For that, we are working cooperatively with parties that manage other academic research networks, local-area networks, commercial network providers including personal computer BBS systems, government/national networks. We exchange various technical information, and of course our network is interconnected with theirs.

Global Cooperative Institutes

- Internet Engineering Task Force (IETF)
- Internet Society (ISOC)
- Internet Architecture Board (IAB)
- Internet Engineering Planning Group (IEPG)
- Asia Pacific Networking Group (APNG)
- Asia Pacific Advanced Network (APAN)
- Asian-Pacific Network Information Center (APNIC)
- Gate Daemon Consortium (GATED)
- The Internet Corporation for Assigned Names and Numbers (ICANN)
- Internet2 (UCAID)

Participating Projects

- *Japan Network Information Center (JPNIC)*
- *apan Engineering and Planning Group / IP (JEPG / IP)*
- *Japan Network Operators Group (JANOG)*

and other academic activities

WIDES PRESS RELEASE

Date : December 18, 2000

Private and Academic Sectors Cooperate in Project to Deploy IPv6 forLINUX System
— Towards world-wide standardization and deployment of the
— next-generation Internet Protocol

WIDE Project
Keio University
Kyushu University
The University of Tokyo
MPT CRL (Communication Research Laboratory)
Hitachi, Ltd.
Internet Initiative Japan Inc.
Mitsubishi Electronic Information Netwotk Corporation
NTT Software Corporation
TOSHIBA Corporation
Yokogawa Electric Corporation,

A group comprised of 11 organizations from private and academicsectors has been formed to promote the implementation and deployment of Internet Protocol Version 6 (IPv6) for LINUX system, called as "UASGI Project", http://www.linux-ipv6.org/. Among the organizations participating in the project are the WIDE Project (leader: ProfessorJun Murai, Keio University), MPT Communication Research Laboratory (Director General, Dr.Takashi Iida), Internet Initiative Japan Inc. (IIJ; headquarters: Chiyoda-ku, Tokyo; president: Koichi Suzuki), Yokogawa Electric Corporation, and other organizations. The leading edge research and development of IPv6 for LINUX system in Japan, such as the WIDE project, will be concentrated on the effective implementation. The existing LINUX system has the IPv6 protocol stack, however, based on the evaluation results by the TAHI project (http://www.tahi.org), the quality of the current LINUX IPv6 protocol stack does not have sufficient quality comparing with the IPv6 protocol stack in other operating system (e.g., FreeBSD, MicroSoft WIndows2000). It should be an important contribution for the next generation internet based on the IPv6 technology to develop the high quality IPv6 protocol stack for the LINUX system. The USAGI project has established in October 2000 and collaborates with the related research and development projects and organization regarding the IPv6 system development and deployment, such as the KAME project (http://www.kame.net, for IPv6 for BSD UNIX system) and the TAHI project (http://www.tahi.org, for IPv6 test and evaluation specification and tools). Also, the project operates an trial basis of a shared

experimental wide-area network with work dove-tailing that conducted by the WIDE Project, the Cyber Kansai Project. Output of this project will be on a free distribution and help promote the transition to IPv6 on a world-wide scale. The USAGI project has already realeased the first IPv6 software package for LINUX system, and will release the package every two months.

In addition to solving problems inherent in IPv4 such as IP address space depletion, IPv6 will provide features necessary for sustaining continuous growth of the Internet as information infrastructure integral to both our business and private lives. Organizations in Japan such as the WIDE Project have been instrumental the development of this new protocol, both through participation in Internet Engineering Task Force (IETF) standardization activities as well as through the domestic and international operation of experimental IPv6 network, called as 6-Bone, and through the development of basic IPv6-compliant systems software. This project is sure to demonstrate Japan's competitiveness and initiative in the development of the next generation of information technology.

[Project Concept]

- Project Name :
  The USAGI (UniverSAl playGround for IPv6) Project
- Project Head:
  Dr. Jun Murai (professor, Keio University)
- Project Secretary:
  Hiroshi Esaki, Ph.D,
  Associate Professor, Information Technology Center,
  The University of Tokyo,
  2-11-16 Yayoi, Bunkyo-ku, Tokyo, 113-8658, Japan.
  Tel: +81-3-5684-7303, Fax: +81-3-5684-7775
  Email: hiroshi@wide.ad.jp
- Objective:
  Comprehensive development of IPv6-compliant basic software for the LINUX system, and the experimental operation of an IPv6-compliant network using the developled software, collaborating with the WIDE project, KAME project, TAHI project and the LINUX IPv6 User's group.
- Period of Operation:
  September 1, 2000 - March 31, 2002
- Location:
  Keio University, The University of Tokyo

- Organizations participating in research and development

The WIDE Project (hrrp://www.wide.ad.jp), Keio University,
Kyushu Univeristy, The University of Tokyo,
MPT CRL (Communication Research Laboratoiry),
Hitachi, Ltd., Internet Initiative Japan Inc.,
Mitsubishi Electronic Information Netwotk Corporation,
NTT Software Corporation, TOSHIBA Corporation,

- Home Page:

http://www.linux-ipv6.org/

- Contact Point :

Hideki Sunahara, Ph.D,
Associate Professor, Information Technology Center,
NARA Institure of Science and Technology,
E-Mail: press@wide.ad.jp
TEL: +81-743-72-5151
FAX: +81-743-72-5149/5159

June 6, 2001

Distributed IX in the Tokyo Metropolitan Area
- Experimental Operation with IP version 6 and Broadband Internet -

WIDE Project
Director: Jun Murai

WIDE Project (Director: Dr. Jun Murai of Keio University) has started the experimental operation of the distributed NSPIXP-2, the largest Internet interconnection points in Japan, to multiple sites distributed in the Tokyo area. Furthermore, the IP version 6 support, intended to provide production level quality has also been launched.

NSPIXP-2 is the IPv6-based IXP (Internet eXchange Point) that has been conducted by WIDE Project since 1995 as a demonstration experiment of Internet interconnections. It is the largest Internet interconnection point in Japan where more than 50 Internet Service Providers (ISP) are interconnected to each other in the KDDI Otemachi building. As the supply of optical fibers becoming affluent in Tokyo and the need to cope with data centered contents by high-speed networking a must, the experimental operation of the distributed NSPIXP-2 has been put into operation by interconnecting multiple sites and the KDDI Otemachi building with optical fibers.

In the current experiment, five sites in the following five companies have been interconnected from the KDDI Otemachi building with optical fibers in a bandwidth between 4Gbps to 8Gbps using the Gigabit Ethernet multiplexing technology: Level 3 Communications Corporation (Minato-Ku), MCI World Com Japan Corporation (Minato-Ku), MITSUBISHI ELECTRIC INFORMATION NETWORK CORPORATION (Shinagawa-Ku), NTT Communications Corporation (Chiyoda-Ku) and TOKYO TELECOMMUNICATION NETWORK CO., INC. These distribution sites will be increased in the future.

Moreover, with the availability of the IP version6, the distributed IXP which until recently has been implemented at an experimental level will now offer a production level quality IP version 6-based exchange point.

This broadband distributed IX allows contents service providers a stable and broadband environment for their service from a selection of multiple sites. In turn, this promotes the broadband contents and allows both ISP's and contents service providers to freely select the most appropriate site for providing services.

WIDE Project has been conducting research and development (R&D) for enhancing and promoting a stable broadband IX with IPv6 support in order to accommodate the ever increasing bandwidth traffic. We believe this broadband distributed NSPIXP-2 to be an indispensable "cornerstone" for the development of the next generation Internet. We will continue to cooperate with ISP's , contents service providers and the data center to promote R&D..

<Access points for NSPIXP-2 in alphabetical order>

- KDDI Corporation
  KDDI Otemachi building, Otemachi, Chiyoda-ku, Tokyo

- Level 3 Communications Corporation
  Level 3 Tokyo Gateway, Toranomon, Minato-ku, Tokyo

- MCI WORLDCOM Japan, Corporation
  WORLDCOM Roppongi Center, Roppongi, Minato-ku, Tokyo

- MITSUBISHI ELECTRIC INFORMATION NETWORK CORPORATION
  NF Park Building, Shinagawa-ku, Tokyo

- NTT Communications Corporation
  NTT Otemachi building, Otemachi, Chiyoda-ku, Tokyo

- TOKYO TELECOMMUNICATION NETWORK CO., INC.
  @Tokyo Central Center, Toyosu, Koto-ku, Tokyo

<Comments from participating corporations>

Tetsuya Yamane, IP business supervising principal department/IP business development general manager

I believe the distributed operation of NSPIXP-2 that has been supporting the development of the Internet in Japan will promote improvement of the Internet infrastructure in the coming broadband age in Japan. KDDI is committed to the Next Generation Network through this project.

Kohji Furuta, Representative president of Level 3 Communications Corporation

Level 3 Communications Corporation is pleased to participate in this epoch-making project for distributed operation of NSPIXP-2 at Tokyo Gateway. Level 3 will contribute to the development of Internet in Japan through providing quality communication services to corporations participating in this distribution experiment

and to other new broadband needs.

Vinod Kumar, Representative president, MCI WORLDCOM Japan Corporation

We hope the Roppongi Center, selected as one of NSPIXP-2 extension sites to be utilized as a business site in the metropolitan center. We hope that the installation of the distributed NSPIXP-2 switches will give both rise and growth to e-businesses providing broadband contents.

Yoshihiro Nakao, managing director/network service supervising general manager, MITSUBISHI ELECTRIC INFORMATION NETWORK CORPORATION

We believe that we can offer a comfortable Internet environment to the users of iDC or Internet since high-speed access to servers of iDC has been realized by distributed operation of IXP. We also believe the number of distributed sites will increase. This along with IPv6 will lead to a greater positive change to the Internet and to its increasing needs in Japan.

Michio Tashiro, Network Business Department, Business managing director, NTT Communications Corporation

We are very pleased to participate in this historical experiment of distributed broadband by NSPIXP2 from it's startup. By allowing synergy with the solid network infrastructure offered by NTT Com, we will be able to contribute "sites" where various market and business models can be created. We hope we can promote the next generation Internet through shift to the broadband or IP v6 technology by cooperation with other corporations.

Akimasa Watanabe, Managing director/IP Technology general manager, TOKYO TELECOMMUNICATION NETWORK CO., INC.

We hope this distributed operation of IXP will increase connections from ISP as well as for ASP and further develop the Internet in Japan. The company is committed to support more needs by installing distribution sites in the @Tokyo Central Center - the center which will be enlarged to 140,000m2 to become the largest level site in the spring of 2003.

For information, contact:

○ WIDE Project press@wide.ad.jp

○ KDDI Corporation
IP business supervising principal department/IP business development
TEL: +81-3-3347-6849

○ Level 3 Communications Corporation
Doi, person in charge of publicity
TEL: +81-3-5549-8466 / e-mail : wataru.doi@level3.com

○ MCI WORLDCOM Japan, Corporation
Ikuta and Noguchi, Management & Planning Dept.
TEL: +81-3-5539-0071

○ MITSUBISHI ELECTRIC INFORMATION NETWORK CORPORATION
Nakayama, person in charge of publicity
TEL: +81-3-5276-5804

○ NTT Communications Corporation
Tanaka and Minami, IP Network Dept. Network Business Div.
TEL: 0120-037506 / e-mail: gigaway@ntt.com

○ TOKYO TELECOMMUNICATION NETWORK CO., INC.
Information & Publicity Gr. Management & Planning Dept.
TEL: +81-3-4555-2173

Appendix L

Documentation of Equipment Set-up for ISDN Pheonix Wide Codec to SCS Patch Panel

I. General Overview

Pheonix Wide Codec

SCS Patch Panel ◄

Line Converter ◄

ISDN ◄

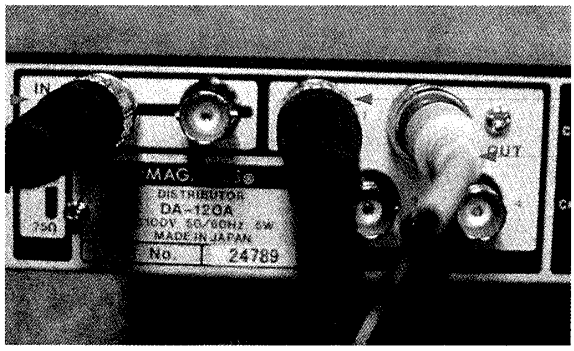
► Distributor

► Line Converter

► Test Monitor

Imagenics Distributor

Codec Video Out ◄

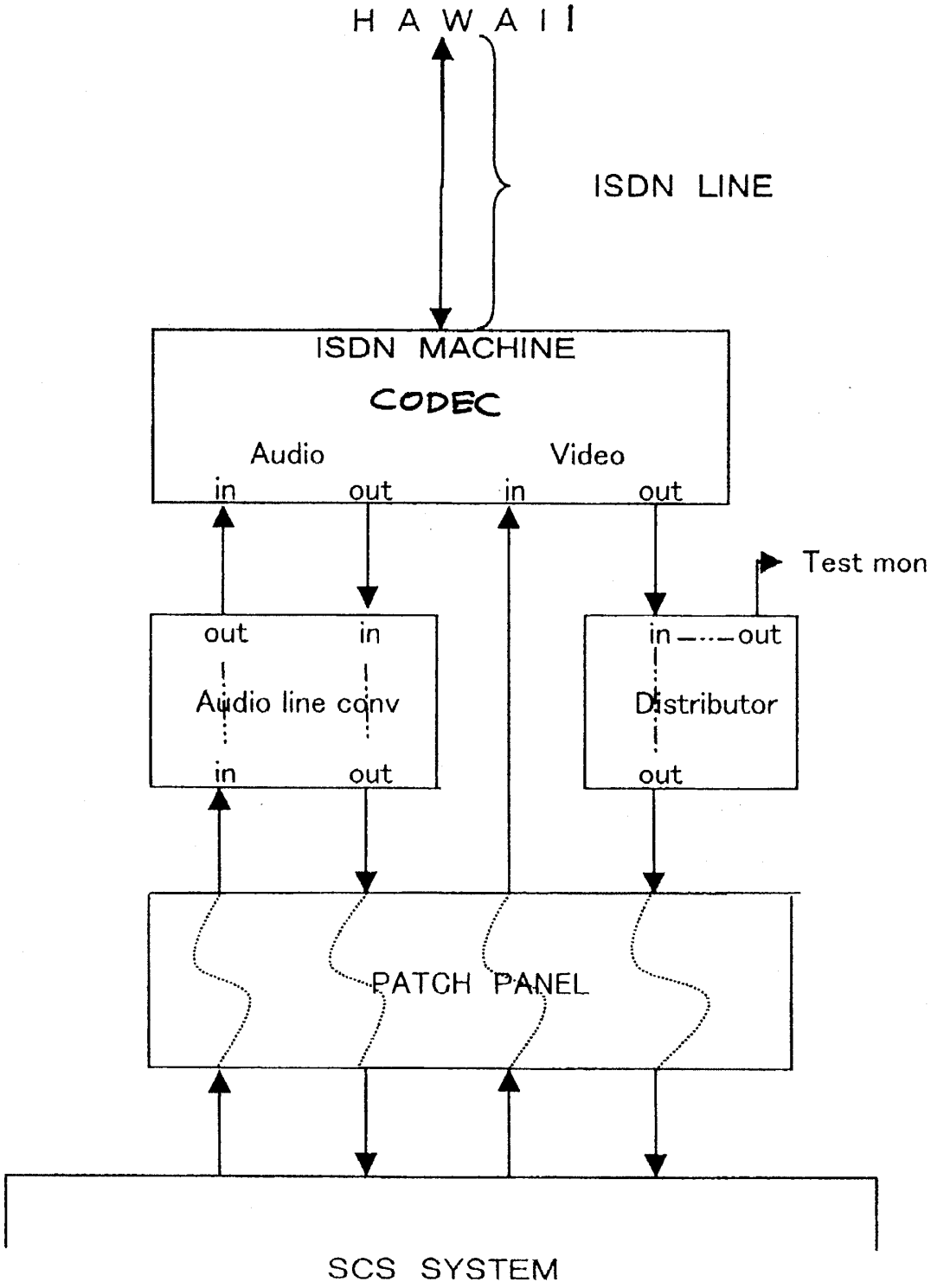


► SCS Patch Panel

► Test Monitor

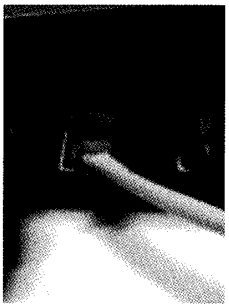
II. Technical Diagram

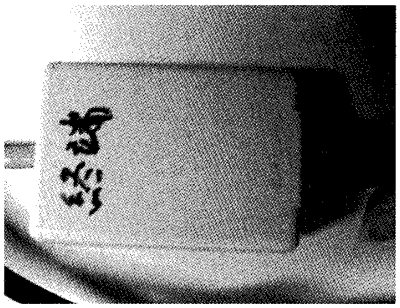
Diagram by Ikeda-san, NIME NOC

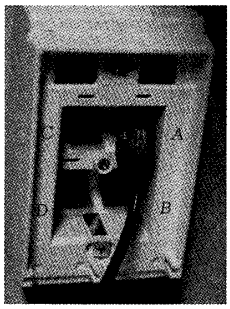


III. ISDN

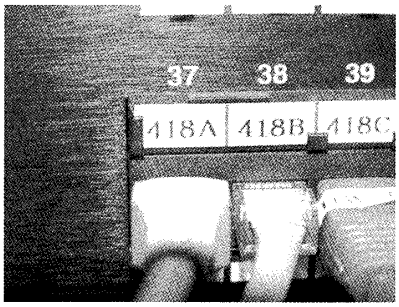
A. ISDN line connect from the back of the codec
B. To an ISDN termination Box
(This is required for the Pheonix Wide Codec when connecting through the NTT aIX box because there is a termination unit at the NTT aIX box and not directly in the Pheonix Wide Codec.)
C. To the jack 'A' in Room 418 (SCS Studio)


(A) Back of Codec

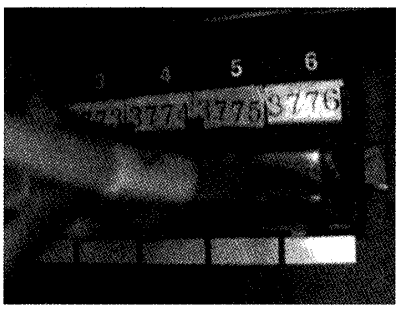

(B) ISDN Termination Interface


(c) ISDN Jack

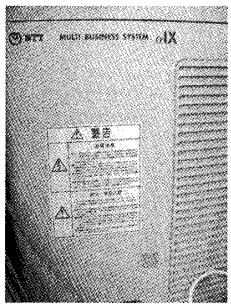
D. At PBX connect jack 418 'A'
E. To ISDN Port 3774
F. The Pheonix Wide requires either a Direct ISDN line from the PBX or an ISDN termination interface if going through the NTT aIX box.



(D) ISDN Jack to Room 418

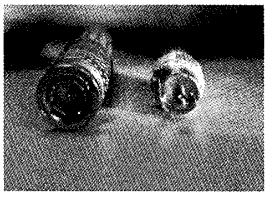


(E) ISDN Port

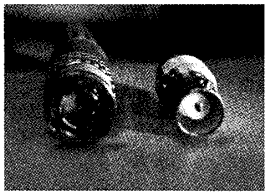

(F) NTT aIX box

IV. ISDN Codec Connection to SCS Patch Panel

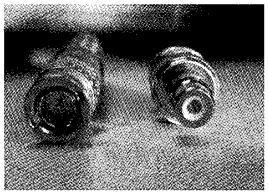
A. Cable Connector Converter Required
   1. (4) Male Composite to Female BNC (back of codec)
   2. (1) Female Composite to Female BNC (back of distributor)



(Male Composite to



Female BNC)



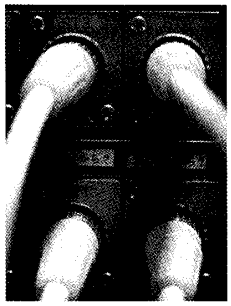
(Female Composite to

Female BNC)

B. Back of Codec - Video In (Yellow Port) to
C. SCS Patch Panel (connector under table in studio)

(B) Video In (Yellow)

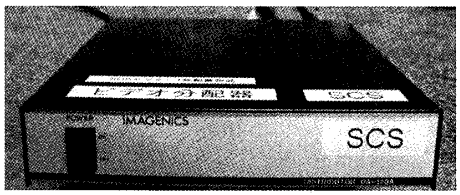
(C-1) SCS PP



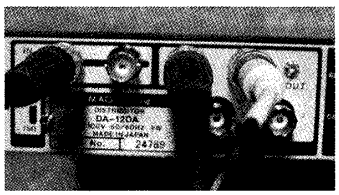
(C-2) SCS PP

D. Back of Codec - Video Out (Yellow Port) to
E. Distributor Video In
F. Distributor to SCS Patch Panel ST 2 or ST 1 (TBC)
G. Distributor Video Out to Test Monitor Video In

(D) Video Out (Yellow)



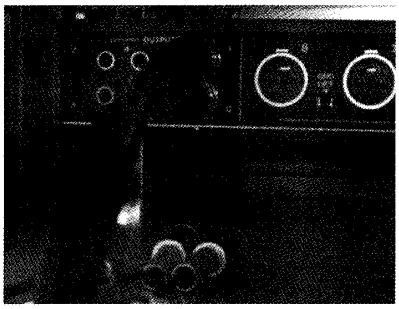
(E) Distributor



(F &G) In to Codec, Out to TM

H. Back of Codec - Audio Out (White Port) (L) to
I. Line Converter - Audio In

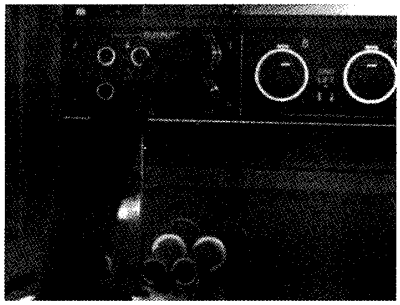
(G) Audio In (White)



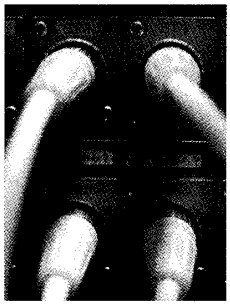
(H) Line Converter Audio Out

J. Back of Codec - Audio Out (White Port) (R) to
K. Line Converter - Audio In
L. Line Converter to SCS PP

(I) Audio Out (White)



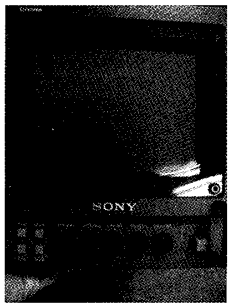
(J) Line Converter Audio In



(K) SCS PP

M. Back of Codec - Audio Out (L) to
N. Test Monitor

(L) Audio Out (Red)



(M)Test Monitor

V. Notes

A. Echo Problem – there is a slight echo from the Pheonix Wide codec unit. This unit cannot be muted and therefore it picks up audio from the studio. Masking the microphone eliminates some of the echo but not entirely.
B. ISDN – the ISDN terminator interface is required only for the Pheonix Wide when connecting through the NTT aIX Business Box. When using the Pheonix Mini this interface is not required.

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